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THE NEW NAVAL GENERAL STAFF. See p. 56.
REINFORCED-CONCRETE MOTORSHIP "BETON I." (Drawings). See p. 58.

SHIPBUILDING AND SHIPPING RECORD

A JOURNAL OF SHIPBUILDING, MARINE ENGINEERING, DOCKS, HARBOURS AND SHIPPING

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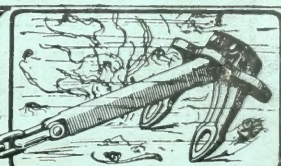
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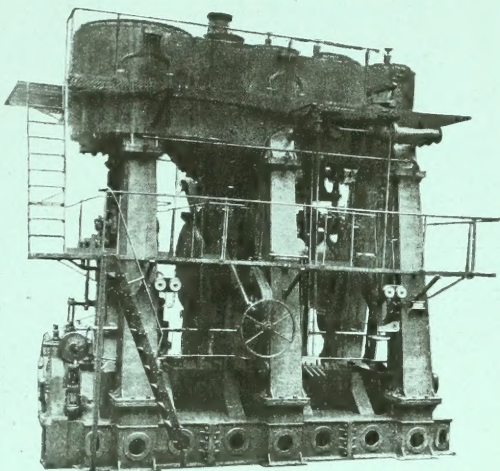


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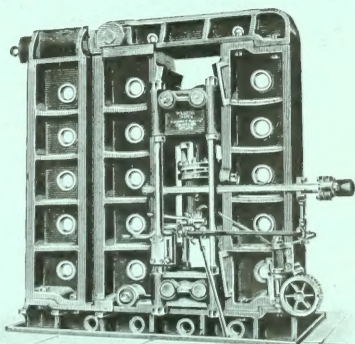


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An Index to the Tenth Volume of SHIPBUILDING AND SHIPPING RECORD, covering the issues from July 5 to December 27, 1917, is presented as a Supplement to each copy of this week's issue.

THE Admiralty have been accused at various times in the Press with not having realised the value of camouflage as a means of assisting to defeat the attacks of enemy submarines on merchant ships, and that such camouflage as has been

Disguise at Sea. tried is not of British origin. An official document has been issued refuting these charges, in which it is stated that several months ago

a system of camouflage was originated, the principles of which cannot be divulged, but of which it may be said that it does not have invisibility as its basis. The theory of rendering ships at sea invisible by painting them different colours is no longer tenable. Numerous schemes have been given fair trial by the Admiralty under actual conditions at sea, but it has been finally established that unless a vessel and her smoke can be rendered absolutely invisible no useful purpose is served. The application of Thayer's Law is most commonly put forward as a means of obtaining invisibility. This is, broadly speaking, an adoption of Nature's means for eliminating shadows, and so reducing the visibility. It is stated that this can be applied to ships by painting the ceilings of

promenade decks or other projecting structures white in order to eliminate all shadows. Actual experience at sea has proved that this is a fallacy, and that the paint itself being dependent on the light of the sky will not overcome shadows. The official statement declares that the scheme now in use has been extensively taken up, not only by the British, but also by the Allied Governments, and no stone is being left unturned to utilise this important asset which is only one of the many devices which are used to combat the enemy's submarine activity.

One of the essential features in the equipment of any up-to-date port is the provision of a large amount of cold storage accommoda-

Cold Storage Accommodation. tion into which the cargoes landed from vessels having insulated space can be transferred and stored until such time as they are required by the public for consumption. It is well known that as far as the majority of our great ports are concerned, cold storage capacity is most inadequate. The announcement that Treasury consent has been given to a grant of over £750,000 for the extension of cold storage accommodation in this country is, therefore, a satisfactory indication that the importance of this question is at last appreciated by the authorities. In addition it has been stated that there is at the moment large accommodation vacant in the Port of London, and that further accommodation will shortly be completed. The Port of London Authority is to be congratulated on the provision of a new, thoroughly equipped store, the forthcoming completion of which has, it is understood, been much facilitated by the efforts of Mr. John Wardle, the late Director of Cold Storage, in securing priority for materials and enabling the work of equipment, which had been stopped, to be resumed. But while London will remain the chief distributing centre, it is essential in the naval and mercantile marine interests that other ports shall also be adequately equipped.

We recently referred to the custom current in America of paying claims on insurance policies in excess of a certain amount. In that country the custom appears to be almost universal, while in this country the general practice is to pay claims in full with the exception of those for particular average which are generally payable only when they reach 3 per cent. of each valuation separately or on the whole, except in certain circumstances defined in the Institute Time Clauses. The one form of excess insurance which has achieved any degree of popularity in this country seems to be that provided for by what is known as the "Jansen Clause," and by which the excess of 3 per cent. of the whole valuation is payable except in the case of total loss. This form of insurance is generally used in the case of old steamers, but a fairly modern fleet has recently been placed on those terms with an option of going on risk with full Institute Clauses. In the event of the option being exercised an additional premium of 30s. per cent. is payable, from which provision we can gain some idea of the value at which the Jansen Clause is estimated by underwriters.

American Insurances and the Jansen Clause.

There has been some discussion in underwriting circles recently as to whether the insured values of steamers have risen proportionately with the cost of repairs. The question is of some moment, as upon the answer depends, to a certain extent, the correlated question of the result of underwriting particular average risks. The adjustment of general average claims being made on the actual value of the vessel the insured value does not enter into the question, except, and so far as, excess general average insurances are concerned, but particular average being adjusted on the insured value, the effect of the relative increases in values and repairs is naturally of moment. To obtain reliable statistics bearing on the question is difficult, but it would be interesting to observe the amount per cent.

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settled on a policy for a particular average claim of a well defined nature, and compare it with an identical claim for repairs effected on the rates current immediately preceding the first indications of increased cost brought about by the war.

President Wilson, in his programme of peace aims, takes up the question of the freedom of the open seas. He seeks as his ideal

Freedom of the Open Seas. "absolute freedom of navigation upon the seas outside territorial waters alike in peace and in war except as the seas may be closed in whole or in part by international action for the enforcement of international covenants." It is to be observed that the enunciation of the ideal in this shape takes into view international relationships which are not yet established. For the moment it marks the repulsion which a humane mind feels for the unregulated ferocity of the German submarines on the high seas, and the conviction that the concerted forces of civilisation must be arrayed to repress such excesses in the future. If the vague German professions to discuss "the freedom of the seas," in connection with peace conditions have any reality, they will find no disposition on the part of America to admit any relaxation of the well-ascertained limits of belligerent activity. The hateful submarine wickedness stands convicted by the common instincts of mankind.

When the idea of standardised ships was mooted a great many British owners took the view that it was inapplicable to their case.

Owners and Standardisation. Their ship types had been developed they, in effect, said in the course of actual service, and were therefore bound to be more suitable and more economical than ships built in series. There was something in what they said, although obviously they inclined to over-stress the point. Standard designs were, for instance, quite conceivable which would be suitable to, and economical in, a fairly wide range of cargo trades. Now that actual standardised ships exist, and are at work, it would be interesting to know what the effect is, if any, on the body of shipping opinion which we have indicated. Are many owners still of a mind that the idea is inapplicable? Moreover, has the knowledge of standardised vessels which they now possess induced superintendents to overhaul their lists of essentials? A great deal obviously depends on the superintendents who have, it is not to be denied, played a notable part in the development of the cargo steamer. New factors are, however, coming into the reckoning which they will be unwise to ignore. When the war comes to an end, the shipbuilding industry, under the pressure of a tremendous demand for tonnage, will naturally produce what it can most profitably sell, and what it is able most profitably to sell will almost certainly be duplicated designs. The owner or superintendent with ideas of his own will be obliged to wait. That he will wait is, however, highly improbable; he will take what he can get. And what he gets will depend on the part he plays now in the evolution of standardised designs. Unless he makes his voice heard within a comparatively short time the standardised vessels of the post-war period will be pure shipbuilders' ships.

There is reason to believe that the new arrangement which has been concluded between the British and French steamship lines in regard to passenger traffic will have a wider scope than the organisation which was on the point of dissolution, if its operation had not, in fact, been actually suspended, before the war began. Much, however, will depend upon the negotiations now in progress, though a definite agreement is not expected until peace is restored, and the situation on the Atlantic is clearer than is certainly the case to-day. It may be remembered that in the closing months of 1913 the Hamburg-Amerika Line and the Norddeutscher Lloyd raised the question of their obtaining a larger percentage of

the steerage business, in view of the bigger boats they were placing in service. Naturally, the other companies objected, and for a time the "pool" almost ceased to have effect. In the Adriatic too, the German concerns succeeded in working a good deal of mischief, and in preventing the Canadian Pacific Company from carrying out an arrangement with the Austrian Government as regards traffic from Trieste. Even the Cunard Line was affected in its understanding with the Hungarian Government for the transport of emigrants from Fiume, and after the outbreak of hostilities an Austro-German combine was formed for the entire exclusion of foreign, and chiefly British, interests from these two ports after the war. Under the circumstances, the enemy concerns cannot now very well complain about the attitude which has been adopted by the newly-constituted conference. In fact, German intrigue has been a source of trouble in the shipping world for many years, and the proscription of this undesirable element is, therefore, very necessary. The scheme will, however, be made more effective by prohibiting the Hamburg and Bremen companies from calls at British and French ports in the channel.

Attention has frequently been drawn in these notes to the measure of success which is attending the shipping concerns of other countries,

Japanese Shipping Prosperity.

in order to visualise the measure of the competition which British shipowners will have to face after the war. The results achieved by the Nippon Yusen Kaisha during the last half year are worthy of being summarised in this connection. For the six months ended September 30, 1914, the profits amounted to £479,878. Since then they have risen progressively in the corresponding periods of 1915, 1916 and 1917 to £869,624, £1,977,564 and £3,147,020 respectively, while for the same periods the dividend distributions have risen from 10 per cent. to 15 per cent., to 28 per cent., and now to 50 per cent. The profits for the last half year also allow for the placing of £1,997,908 to various reserve and dividend equalisation funds. At the same time the directors propose that the share capital of the company be increased from £4,400,000 to £10,000,000. According to the *Japan Weekly Mail* the reason for this increase of capital is said to be the world-wide competition which is expected to occur after the war. It is also reported that the schemes of the company provide for the construction of 50 vessels, mainly cargo steamers, representing 400,000 tons, and also for an extension of the European and American passenger services. This latter plan is said to be based upon a permanent subsidy from the Japanese Government, while the Nippon Yusen Kaisha authorities are credited with the intention of operating passenger steamers superior to any maintained by shipping companies before the war.

Mr. Justice Bailhache said, in a recent salvage case, a vessel which in certain parts of the sea suffers in these days, a sea peril, also incurs to a greater or less degree a war peril at the same time. In the case under review, the *Pyman Steamship Company, Ltd. v. the Commissioners of the Admiralty*, the steamer *Railwaite* belonging to the plaintiffs was running under Admiralty Charter T 99 when, on a voyage from Rotterdam to the Tyne, her intermediate propeller shaft broke, and she was left disabled. Not very far distant lay German minefields, menacing destruction if the vessel drifted into them. Happily the steamer *Caledonia* was at hand to render timely salvage services, and she towed the *Railwaite* back to the Hook. A salvage payment of £3,000 was made. The question arose of the Admiralty making a contribution to this payment in terms of Charter T 99, under which it assumed liability for war risks leaving marine risks to the owners. An arbitrator finding that the *Railwaite* had been exposed to a war peril as well as to a marine peril, and had been rescued from danger of it, decided that the Admiralty ought to contribute £750. Mr.

Justice Bailhache upheld this decision. If the Admiralty were liable to pay for injury suffered by the ship from a war risk, they were also liable to pay for salvage services which saved the ship from such peril. It is to be noted that the judge, in interpreting the charter, set aside the question of *proxima causa* which would have arisen under a policy of marine insurance.

Sir Auckland Geddes, the Minister of National Service, in introducing his Bill to permit more drastic dealing with certificates of exemption on occupational grounds has made it at least clear in his speech that an adequate supply of labour in the shipyards is regarded by him as of most vital national importance. He says that at present men are coming forward, at all events in some districts, in larger numbers than they can be absorbed. Some 10,000 vacancies were notified to the Employment Exchanges in December, and in response more than 5,500 men have been submitted. But more men will be wanted. Sir Auckland invites the enrolment of suitable men as war work volunteers. It is of the utmost importance that all actual vacancies in shipyards should be filled as they arise. All this is self-evident, and it is only to be hoped that in actual practice the sentiments of the Minister of National Service will be given full effect to. Not only must there be vigorous recruitment of the labour supply in the yards but there must be conservation of the supply already available. Sir Auckland Geddes also indicated a useful step in another direction. A scheme for the transfer of dock labour from port to port is under consideration. The more expeditious handling of cargoes increases the effective use of shipping. These problems connected with the use and output of shipping are amongst the most momentous that can engage the attention of the Government.

At first sight it no doubt looks as if it were statesmanlike on the part of the Government to divert further applications for the 12½ per cent. bonus from the War Cabinet Labour Committee to the Ministry of Labour. That is at any rate the direction in which every application after the first ought to have gone. On reflection, however, the reader will probably come to the conclusion that there is nothing statesmanlike in the action at all, because a Labour Committee, advising the Ministry of Munitions, has, with the concurrence of the Minister of Munitions, and presumably also that of the War Cabinet, laid down the lines on which the Arbitration Tribunals are to proceed. All-time working shipbuilding and munitions operatives, who are not already in receipt of the 12½ per cent., are to get it, and low piecework prices are to be revised in the light of the increased earnings of time workers. The arrangement is regarded in quite a number of quarters as an equitable one. A fact of the matter which gives us more concern is, however, that there is absolutely nothing in the original 12½ per cent. Order to justify the recommendation on which the Chief Industrial Commissioner is now to act. The first award was made with the object of removing a good grievance of a particular class of men. The Ministry of Munitions blundered badly in extending its scope, and the effect is not only enormously to increase expenditure, but also greatly to decrease output by making systems of payment by results less popular than ever. It has been a sorry business from the first, and apparently the end is not yet.

Considering that our naval architecture is the most scientific in the world, it is not a little odd to find British shipbuilding practice lagging behind that of one or two foreign U.K. Shipyard countries. In the United States, for example, Practice. the organisation of production is much more conducive to speed and economy of construction. So is it in more than one Continental country; there are, for instance, yards in Holland whose organisations are notably efficient. For

our people's comparative backwardness, the trade unions are, of course, largely to blame. Almost every attempt to advance by means of a new tool or a reorganisation of method discovers them in opposition, and when they yield—they rarely do, of course—the ground given is always the least possible. Only readers who have first-hand knowledge of the lines of demarcation between shipyard traders are able to realise what this process of niggling has meant for the industry. Trade unionists—even representative trade unionists—rarely take large or long views on important questions. It is time, however, that they did, for it is obvious that if foreign shipbuilding industries are to be allowed freedom for economic development which is denied to British shipbuilding, a time is ahead of us which for leanness will beat all records. What is wanted is an end of the niggling process and a broad, workmanlike consideration of the whole general question. It is a pernicious fallacy that the worker gains by keeping down speeds and putting up costs of production. The truth is that he loses, and loses heavily, and for its verification he will have to wait no longer than the end of the war, unless in the interval he decides to take the longer, larger view we have indicated.

Many years ago it was thought that experiments with full-sized ships were necessary if any reliable information regarding the resistance and propulsion of ships was to be gathered. The introduction of the model experimental method by Froude caused the idea of full-sized experiments to be shelved, but the question is again being prominently brought forward, and must receive consideration if our knowledge is to be added to or completed. Mr. Wall's paper, read before the Liverpool Engineering Society, was a plea for the bigger scale work. It is recognised that there are limitations to the value of model experiments, and that occasionally results are obtained by ships, whose models have been run in a tank, which differ somewhat from those expected. On the one hand it may be argued that the full use may not have been made of the model method in the determination of the probable performance. On the other, it is said that the full-sized ship and screws may perform differently from those tried in the experimental basin. It was said by the late Sir Wm. White that the large self-propelled model of the *Mauretania* proved of great value in clearing up some points which could not be investigated properly by the small model method. We can quite understand why that should be, as it is probable that more reliable records of the performances of the screws, for example, could be obtained in the self-propelled model. Whilst each trial of a completed ship is a full-sized experiment the trouble is to so analyse the result obtained that the separate efficiencies of the various factors may be known. This is not possible unless the resistance of the naked ship be accurately determined, of the appendages, and the propeller and hull efficiencies. The scope for further experiment is boundless.

The construction of a fair number of vessels to be fitted with oil engines is proceeding apace. A remarkable example of the commercial advantages of this type of ship over Motor Ships. the steamship was given recently in one of our contemporaries. Cargo ships of 6,000 tons d.w., fitted with two motors each of 1,000 i.h.p. of the four-cycle type, capable of driving the vessel at 10½ knots, burn 7 tons of oil per day. Under normal conditions in peace time it was assumed that the price per ton for fuel in the Persian Gulf would not exceed £2. The cost of oil per day of 24 hours would thus be £14. Sufficient oil can be taken on board to enable the vessel to complete the round voyage to England, and back to the Persian Gulf. A steamer, on the other hand, would probably consume 35 tons per day at a probable cost of coal—at least on East—of £3 per ton. The saving in cost of fuel alone being £91 per day in favour of the motor ship. It is possible that the case has been stated rather much in favour of the

oil-engined vessel, the whole position depends on the relative costs of oil and coal, and on the consumption. Even were the differences stated above too great, there still remains a large balance in favour of the oil engine. In spite of the fact of its greater initial cost, the saving in cost of fuel, in upkeep—if the engine is reliable, in wages, and the greater income gained through greater cargo capacity, offer great inducements for its adoption. The fact that the companies saving out East which own oil-engined vessels are having these built to the exclusion of steamers shows the suitability and economy of the Diesel engine for trade routes in which oil is easily and cheaply procured.

THE NEW NAVAL GENERAL STAFF.

THE formal appearance in the *London Gazette* of the names of the new Board of Admiralty has, not unnaturally, given rise to a good deal of naval comment of one kind and another. In some quarters the changes are held to represent the completion of the triumph of a younger generation of spirited officers with war experience over an older generation who brought to their conduct of the war theories of strategy and tactics which coloured all their actions. We do not undervalue the service of comparatively young officers who believe that it pays in war to be spirited and aggressive. We demur, however, to the implied suggestion that the difference between the men who have gone and the men who have come is that the one group do not believe, and the other group do believe, in the broad principles which have underlain Entente naval strategy in this war. The men belonging to both groups have been schooled in exactly the same principles—principles which have been proved, it should be noted, in many crises—and their ideals are identical.

The truth is that the changes which are now announced, and one or two which have not been announced, represent what may be described as the second important stage of the Admiralty re-organisation which the War Cabinet decided early last year to make. When the first stage was reached we described the position pretty fully, and indicated the relief to the organisation which the changes then made meant. The war had not been long in progress when it became quite clear that, as organised, the administrative machine was unequal to the load it was expected to carry. The ships of the Royal Navy had never before been so numerous, and there were, besides, to maintain, man and provide with munitions, fuel and other stores, unprecedentedly large fleets of auxiliary warships, fleet auxiliaries, troopships, hospital ships, and service vessels. Protection for merchant ships first against enemy surface vessels and then against submarines had to be organised; so had transport for troops and army supplies. Shipbuilding had to be re-organised, and also the manufacture of guns and munitions. And in addition to these multifarious duties there was the greatest naval war in history to carry on. Looking back, the average man marvels—not that the early administrators did so little, but that they achieved so much.

The first important step taken with the object of improving the position was broadly to separate the side of the administration which had to do with material from the side which had to do with the conduct of the war. The post of Admiralty Controller was revived, and suitable new sub-departments were set up under the charge of Deputy Controllers. The important step just taken is in effect to form a Naval General Staff. There is no justification for the suggestion that the change is a sudden one, made in deference to popular clamour. All the reliable signs are on the contrary—the changes since last spring on the Board of Admiralty, for example—that the building up of the new organisation has been a gradual process. Great care has been exercised in the selection of officers, and high hopes are entertained of their efficiency in combination.

The new staff's work is understood to be divided into three main branches—(1) Operations in home waters; (2) Operations overseas; (3) Trade protection operations. The First Sea Lord, who is also

Chief of the Staff, deals solely with large questions of naval policy, the distribution and fighting efficiency of the Fleet, the general direction of the operations of war, and the superintendence of the Naval Staff. The Deputy Chief of the Naval Staff concerns himself with operations in home waters against the enemy, without, of course, in any way affecting the responsibility of the Commander-in-Chief of the Grand Fleet. The Deputy First Sea Lord deals with all overseas questions, including operations against the enemy, and the Assistant Chief of the Naval Staff is responsible for all anti-submarine measures, the conveying and escorting of merchant vessels, and mine-sweeping in home waters.

Under the Deputy Chief of the Naval Staff are the Director of Plans, three Sub-Divisions of the Operations Division, and the Director of the Air Division. A section of the Plans, Operations, and Air Divisions devote the whole of their attention to current operations against the enemy, and another section work out the details of future operations. The Anti-Submarine, Mercantile Movements, Mine-sweeping, and Trade Divisions are under the Assistant Chief of the Naval Staff. In order to leave the Chief of the Naval Staff free from practically all considerations other than those of actually combating the enemy, the Deputy First Sea Lord undertakes the bulk of their paper work.

All things considered it will be agreed, we think, that at any rate the foundations of an excellent organisation have been laid. A Director of Training has, it may be added, been at work for some time. His duty will very largely be to organise training and education in such a way as to ensure that sound principles of General Staff work will be absorbed by those who are most capable of absorbing them. In that way it is hoped to train a large number of young officers for the staff.

PRESERVATION OF CONCRETE VESSELS.

THE use of concrete as a material suitable for the construction of floating vessels has now become one of the established practices of naval architecture, and builders, owners and users of these vessels are therefore bound to be interested in all questions dealing with the preservation of vessels built of this material. Whilst the extended use of reinforced concrete on land is a proof of its suitability for land structures, it has been asserted by many that the peculiar nature of the forces acting on floating structures, especially on structures utilised in rough seas, as well as the action of the sea-water itself upon the surface of the concrete, would produce such serious effects that at the best the life of reinforced concrete vessels would be short indeed.

It must always be remembered that concrete whilst capable of withstanding comparatively large compressive stresses, is unable to withstand only the smallest stresses in tension. Hence, if a floating vessel be treated as a loaded beam we have parts of the material in compression and other parts in tension. The function of the steel reinforcement is to withstand the tensile forces wherever they are likely to occur. In a barge or a structure floating in still water the locality of these tensile forces can be fairly accurately determined, and the reinforcement incorporated in the structure in the proper position and to the proper amount. But in a structure floating in a rough sea, the forces on any one part vary considerably, being now compressive and now tensile, and despite the presence of reinforcement in that part, the tensile stress may be of such magnitude that the concrete itself is subjected to tensile stress with the result that the surface cracks. This cracking is the more likely to occur on account of the weakening effect caused by the frequent change in the direction of the stress.

The effects of cracking of the concrete are cumulative. In the first place, the cracking permits the entry of the water, which has the tendency to cause the concrete to become spongy; moreover, it causes a reduction of the area of the material which is available to resist the bending forces, with a corresponding increase of stress

and an increase therefore of further liability to cracking. Secondly, the entrance of water in the cracks may ultimately lead to the exposure of the surfaces of the reinforcing bars to the corrosive action of the water. This action is also cumulative, corrosion tending to become much more rapid after once it has definitely commenced. It would therefore appear that whilst as a precautionary measure the reinforcement should always be coated with a non-corrosive compound, it will be far better if some way is devised whereby cracking may be prevented, and one of the simplest ways of preventing cracking is to carefully polish the surface of the concrete.

In an article recently contributed to a Norwegian journal, Mr. A. A. Boon states that in polishing the surface of concrete, one not only prevents fouling, and consequently reduces the resistance of the water, but also absolutely guards all the iron against rust. He instanced the case of a pontoon upon which a house-boat had been built, and which had sunk. It was ultimately found that the reinforcement in the bottom had become exposed, and the iron had become rusty, causing the concrete to become spongy in places. This investigation was very instructive, and it shows how necessary it is to exercise great care in the construction of concrete vessels. It is not difficult to explain why the bottom was bad. The pontoon had been built on land, and the bottom cast on the sand without any other mould, and it received no subsequent attention. Water was then allowed to enter the bay where the vessel lay, and it was floated out. This is evidently a very easy method, but it is not safe. To get good results, he asserts, all parts must be easily accessible so that they can be examined, the iron rods must be properly covered, and the surface of the concrete polished smooth.

The polishing of the surface has another beneficial result, however, viz., the prevention of fouling of the submerged surface. In order to show how small concrete vessels are subject to fouling, the author had a concrete vessel, the *De Juliane*, which was built in 1909, docked after she had been running for five years. Only on a few spots was there a slight overgrowth of no significance, while the greater part of the surfaces of the sides of the hull which had been polished and which were exposed to water were quite free from overgrowth. The bottom, which had not been polished on account of the way in which the vessel had been constructed, was covered with white mussels. Other vessels were examined and found to give exactly the same results, and the conclusion arrived at is that concrete surfaces will be practically free from overgrowths when they are polished, but when left rough they are sure to become overgrown. In building concrete vessels, the surface must therefore receive due attention. Polished surfaces constitute an absolute safeguard against fouling, and in addition they tend to prevent the formation of minute cracks on the surface through which the water enters and attacks the steel reinforcement, thus setting up corrosion of the steel.

THE NEED FOR RESEARCH WORK ON THE PROPULSION OF SHIPS.

MR. A. T. WALL discussed the need for research work on propulsion before the Liverpool Engineering Society last month. The number of points raised and considered by the author shows the complicated nature of the problems associated with ship resistance and propulsion, and that still greater knowledge of the factors which enter into the combined result must be gained before a vessel's performance can be foretold with any degree of certainty. Whether full-sized experiments would give all the additional information desired is another question, but some points at present doubtful could certainly have more light shed upon them were such undertaken.

The value of model experiments is not questioned by Mr. Wall. The results presented to the shipbuilding world by the leading experimenters have been of infinite value, and the war vessels and merchant ships of almost all the maritime powers now bear the

impress of experimental investigation. The phenomenal speeds attained by fast liners, cruisers, and destroyers have been made possible largely through the discovery of the forms which best suit the different conditions met with. Although this fact is admitted, it does not follow that the best has yet been attained, or that the analysis of the results obtained has given a true indication of the real value of the various factors concerned.

Whilst it is possible by model experiments to arrive at forms of small resistance and, by comparison of results, to say which offers least, the determination of the horse-power necessary to overcome the corresponding resistance of the full-sized ship cannot be found with absolute accuracy. Mr. Wall had something to say regarding the estimation of the frictional resistance of models and ships. He pointed out that there is a possible source of error in estimating the resistance of a ship from that of a model in this way. The ship form differs in its behaviour with regard to skin friction from that of a plane board, the value of the former being greater than that of the latter having the same length and area, and this increase is greater the fuller the form of the ship. Experiments carried out by Mr. Baker showed that models give a resistance—at very slow speeds—exceeding that deduced from planks by an amount varying from 5 per cent. to 29 per cent. "Unfortunately," says Mr. Wall, "this increase is not the same for the ship as for the model, and it is not possible to say with accuracy what its value is for the former." As the additional frictional resistance experienced by a ship-shaped form over that of a plank having the same length and area is due to the course of the stream lines being greater in length than that of the model, there can, we imagine, be little, if any, error in assuming that the same quantitative results obtain in the model and ship. That experiments on a large scale in order to accurately determine frictional resistance are desirable there can be no doubt. We can imagine, however, that were these ascertained results found to be in conflict with, say, Froude's figures, that the existing data in experimental establishments would not be altered to conform to the new figures, as some basis of comparison between experimental and trial results has already been established.

In his remarks about the resistance of appendages, Mr. Wall said that in estimating the resistance of a ship that of the appendages is usually neglected. In a way that is so, as it is customary to state the effective horse-power as being deduced from experiments on models without these fitted. That does not mean, however, that their influence and resistance is neglected. The propulsive efficiency value may be stated on a naked model basis or on the basis of model with appendages. The results of the trials of American destroyers given in the volumes of the Proceedings of the Society of Naval Engineers usually show both values. In practice in this country an allowance varying from 5 per cent. to 20 per cent. is made according to the type of brackets, or bossings, the angle of same, and the extent of the bilge keels. The information given by Captain Dyson, to which Mr. Wall referred, is probably the most valuable at the disposal of naval architects and should allow of a tolerably close estimate being made of the appendage resistance. It is supposed that the appendage resistance as measured by model experiments exaggerated the truth, but on this point the opinion of experts is conflicting. Sir Archibald Denny has stated that, as the result of the experience gained at the Dumbarton tank, and on ships trials, he was of the opinion that the law of comparison held and that a close estimation to the final result could be made.

With regard to wind resistance, some reliable information is greatly to be desired. In the trials of a recently built vessel of the cross-channel boat type of hull, but with greatly increased upper works, the results obtained fell short of those anticipated. That this was due, in part, to the wind resistance was known, but to assess an actual value to this in terms of power was found to be impossible. Some careful observations made on full-sized ships would enable useful information to be gleaned on this point.

Mr. Wall devoted a considerable portion of his paper to consideration of the questions of propeller and propulsive efficiencies. There

is a great amount of experimental data available regarding the potentialities and efficiencies of small-sized screws, but whether these hold exactly in the full size is open to doubt. Small propellers are usually thinner than the actual, smoother of surface, with smaller bosses, and with finer edges than those actually fitted. It is customary, with some naval architects, to assign a value—called the blade thickness fraction—which makes allowance for these variations. This allowance has been estimated from considerations of what was necessary to balance up the factors which comprise the propulsive efficiency value. Were the efficiencies of full-sized screws determined, the effects of size of hub, thickness and surface of blades, &c., could be ascertained, and what is meantime a matter of conjecture would be definitely known.

In the discussion which followed the reading of Mr. Wall's paper, some instances were given of contradictory results from the trials of sister ships. To a large extent these are due to different mechanical efficiencies of the machinery. With vessels of the same shape, similar appendages, and with propellers of the same diameter and pitch, there should be no difference in result were the engines performing alike. It is impossible to estimate the power developed by reciprocating machinery to within 5 per cent., and even after making allowance for this, the mechanical efficiencies of similar engines may vary as much, and sometimes they do vary more.

As indicated by Mr. Wall, there are still many points worthy of thorough investigation, and in order that the best type of hull may be associated with the best type of screw these investigations ought to be carried out in the national interests.

PUBLICATIONS RECEIVED.

[A short notice of any publication does not necessarily preclude the subsequent appearance of a longer review.]

Precision Grinding Machines. By Thomas R. Shaw, A.M.I. Mech.E. London: Scott, Greenwood & Son, 8, Broadway, Ludgate, E.C. 4. 215 pp., with 170 illustrations. 5½ in. × 8¾ in. × ½ in. Cloth, 10s. 6d. net.

Transmission Gears: Mechanical, Electric and Hydraulic for Land and Marine Purposes. By Edward Butler, M.I. Mech.E. London: Charles Griffin & Co., Ltd., Exeter Street, Strand. xii. + 164 pp. With 129 diagrams, including nine folding plates. 9 in. × 6¼ in. × ½ in. Price, 8s. 6d. net.

Modern Whaling and Bear Hunting. By W. G. Burn Murdoch, F.R.S.G.S., F.B.A. (Scot.). London: Seely, Service & Co., Ltd., 38, Great Russell Street, W.C.1. 320 pp. With 110 illustrations, chiefly from drawings and photographs by the author. 5½ in. × 8½ in. × 1½ in. Cloth, 21s. net.

CALENDARS FOR 1918.

Cammell, Laird & Co., Ltd.—The calendar issued by this firm consists of two artistic illustrated cards, each 11½ in. by 14½ in., with the first six months of the year on one and the second six months on the other. The illustrations are effectively produced in colours. One is entitled "For King and Country," and is a reproduction of the painting by E. F. Skinner, and shows women at work making munitions. The other is a fine reproduction of the famous *Birkenhead*, after the original painting by A. J. W. Burgess, R.I.

Sir W. G. Armstrong, Whitworth & Co., Ltd.—The calendar issued by this firm is more particularly a pictorial production, the calendar, as such, being insignificantly small. The illustration, however, is an artistic work in colours (14 in. by 8 in.), the subject being the sinking of the German battleship *Blucher* at the Jutland fight, from the original painting by Montague Dawson. It is well mounted on superior art card, 20 in. by 14½ in., with gilt lettering.

The P. & O. and British India Steam Navigation Companies.—A useful pocket calendar and diary (5 in. by 4 in.) is issued by these companies, containing a good deal of information relating to their constitution, agents, fleets, services, &c. An illustration forming a frontispiece shows two of the companies' steamers at the entrance to the Bitter Lakes. There are also statistical tables of general interest and several coloured maps showing the steamship lines of the companies throughout the world, and two pages are devoted to the coloured flags worn by merchant vessels of different countries.

REINFORCED CONCRETE MOTORSHIP, "BETON I."

BUILT BY THE PORSGRUND CEMENT WORKS, NORWAY.

In the *Shipbuilding and Shipping Record*, October 11, 1917, on page 348, we published an article describing the launch, bottom upwards, of a reinforced concrete motorship of 200 tons. We are enabled this week to publish a further series of pictures showing the vessel in the course of erection, and also drawings showing the general arrangement of this vessel and the details of construction.

It is interesting to recount the steps which led to the erection of vessels of this type in an inverted position. In 1915, the Porsgrund Cement Works received an order from the Municipality of Porsgrund for a bridge pontoon of reinforced concrete. The pontoon was built in October, 1915, the length was 6 metres, the breadth 5 metres, and the depth 2 metres; it was decked in fore and aft, and had two watertight bulkheads. A double mould was used, and the casting was done very expeditiously. The bottom and sides, the ribs and bottom beams were all cast between 6 in the morning and 10 at night, and the deck was finished next day at noon. About 20 men were engaged on the work, and it was forced as much as possible to avoid joints in the casting. A 1:3 mixture was used, with small stones in the ribs only, the thickness of the walls being made 50 mm.

In carrying out this job in the yard, great difficulty was involved in the use of double moulds, i.e., the outer and the inner mould. The placing of the reinforcement in place was very tedious work, and one could not be quite certain that it was in the right position everywhere. The casting was also very difficult, as it was necessary to exercise the greatest care in order to obtain a uniformly good quality throughout. The points of greatest difficulty were where the sides and the ribs joined the bottom, and there turned out to be faults at one or two points which had to be made watertight subsequently.

The experience gained in carrying out this work led the company to realise that it must find another method if the building of ferro-concrete vessels was ever to become practicable. In the case of lighters with a very nearly rectangular cross-section, the difficulties might easily be surmounted if all possible care were taken, but in building vessels with the lines of a ship, the difficulties would certainly be far too great. The manager of the company, Mr. Alfsen, who had given his personal attention to the work, had for a long time held the opinion that it would be a great advantage if one could build concrete vessels with the bottom upwards, inside moulds being used, and outside moulds only where the sides were vertical. But this gave rise to the difficult problem of how comparatively large vessels should be turned the right side up. The solution of the problem was found last year by Mr. Alfsen, and the invention has been patented in Norway and in all other important countries. The vessel is allowed to take the water in its inverted position, it is gradually sunk by allowing water to enter, the position of its centre of gravity is altered, and the vessel therefore turns over by itself in the manner described and illustrated in the article referred to above.

In the autumn of 1916, the Porsgrund Cement Works decided to increase its capital for the purpose of taking up the building of reinforced concrete vessels according to Mr. Alfsen's invention, and the first ship they decided to build was a 200-ton motor vessel called the *Beton I*. The calculations were carried out by Messrs. Ronde and Norman, and Fig. 1 shows the sectional elevation and the plan of the vessel together with one or two of the more important details, with the principal dimensions (expressed in millimetres) inserted. Fig. 2 shows a mid-ship section in addition to the arrangement of the reinforcement at the bow, the stern and at other typical positions of the hull. These two figures have been prepared from drawings made by Messrs. Ronde and Norman. The calculations which had already been made for lighters could not be used as a basis, as they were made on the assumption that the vessels would be used in protected waters and in rivers. Sea-going vessels are, however, subjected to much greater strain, and it was therefore found necessary to make the reinforcement 50 per cent. more massive in sea-going vessels than in

lighters, and the size of the ribs and the beams had also to be considerably increased. A very rich mixture was chosen for the concrete and no stones were used. The thickness of the hull was to be 50 mm. and the height of the ribs 600 mm. at the bottom and 250 mm. at the sides, the thickness of the ribs being 150 mm.

The inner mould is fully erected beforehand with the keel uppermost on a kind of carriage which is allowed to go into the water with the vessel. This is shown in Fig. 3, from which can be seen the arrangement of the ribs. The reinforcement is next put into place everywhere before casting is commenced. The general arrangement of the reinforcing rods can be seen from Fig. 4. The cement is then cast on the inner mould of the required thickness, no outer

the darkest part of the night. Setting of the concrete takes about three weeks, so that a vessel can be built on the same bedding once every six weeks. During the casting 40 men were employed on the work, and for a short time up to 55 men. The work was done partly by hand and partly by air pressure with apparatus specially constructed for the purpose. No outer layer of finer material was put on, as the whole substance is of very fine material. This was carefully polished on the outer surface.

The mould was constructed of good solid material, in sections, so that it could easily be taken apart and re-erected. The mould will be used a great many times, it being recognised that provided large numbers of standard types are built, the production will doubtless

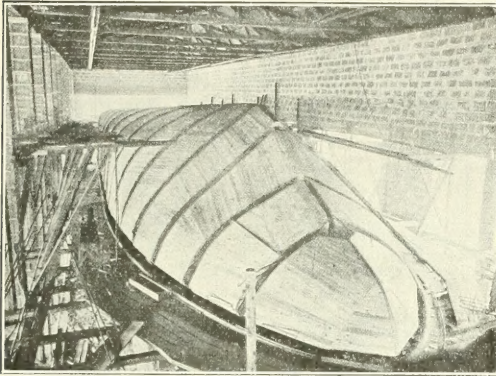


Fig. 3.—Wooden Inner Mould on Launching Cradle.

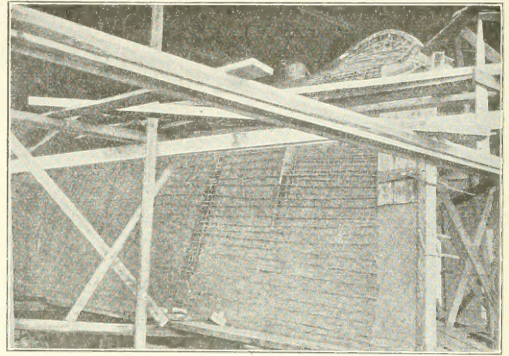


Fig. 5.—The Stem being "Cast."

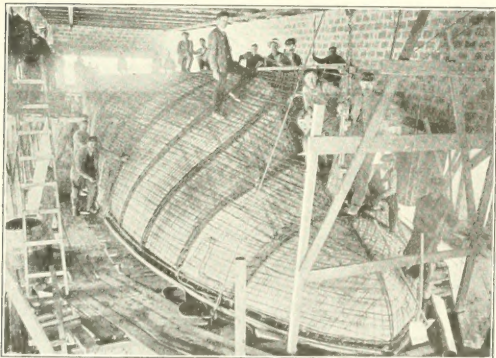


Fig. 4.—Fixing the Steel Reinforcement in Position.

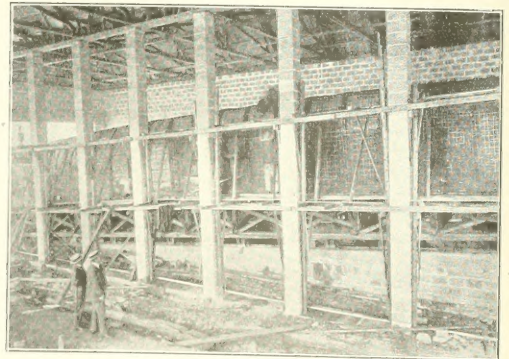


Fig. 6.—Casting the Midship Portion.

mould being used save where the sides of the vessel are vertical. The method of casting is clearly seen in Figs. 5 and 6. In Fig. 5 the stem of the vessel is seen in process of being cast, whilst in Fig. 6 a side view of the vessel is given. In the case of *Beton I.*, the first vessel to be built in this way, the erection of the mould took about three weeks, and the placing of the reinforcement about the same time. It is expected that these operations will only take about one-half the time on subsequent occasions. The casting itself was done in two days; it was commenced on a Thursday morning and finished on Friday evening, and the vessel was fully polished and finished off by Saturday noon. The work was stopped for a short time in

be very cheap and rapid. It is interesting to add that already news has been received in this country that *Beton II.* has been successfully launched.

GÖTA WERKE DEVELOPMENT.—All Swedish yards have extended their equipment considerably during the war, but the greatest development has occurred in the Göta Werke which has not only the largest vessels built in Sweden on its stocks (several motor-ships of 9,200 tons), but is also booked for years ahead with similar constructions. Formerly the output of this yard was estimated at 15,000 tons per annum, but, granted sufficient supplies of materials, it should be 100,000 tons per annum after the war.

REFRIGERATOR INSTALLATIONS FOR CARRIAGE OF SHIPS' PROVISIONS.*

By JAMES B. WILKIN, M.I.Mech.E., M.I.N.A.

This question has become a very important one in passenger steamers, and on the Continent much more attention has been given to this subject than here. A few years ago only passenger steamers were fitted for this purpose. It is now becoming a common practice for all first-class cargo boats to be fitted with such installations, even where no passengers are carried. In the future, few vessels will be built without this useful provision.

Not only is it much better for the health of the crew generally to have a plentiful supply of fresh provisions, but it will be found on investigation that the cost of victualling a crew is cheaper on a vessel fitted with refrigerator chambers than a similar vessel not fitted, especially so where a vessel is employed on long voyages.

Although better wages and improved accommodation are now being provided than formerly, the food question is always an important one, and must be provided for if it is desired that the right class of men should be induced to take up a seafaring life.

For the purpose of providing the requisite refrigeration, several types of refrigerator machines have been employed in the past, including cold air machines; ammonia compression machines; ammonia absorption machines; CO₂ compression machines. These machines being used in conjunction with the following systems of cold distribution:—Cold air direct; brine grid circulation; direct expansion; cold air by brine and battery system.

Considerable difficulties were experienced in the past to obtain the requisite efficiency and reliability. The result of this experience has been that, with the class of installation referred to in this paper, the CO₂ compression machine has been universally adopted, the chief reason for this being that there is no objection to the placing of a CO₂ machine in the main engine room, where it is under the direct supervision of the engineer on watch in the engine room.

It is also an advantage that copper pipes can be used for the condenser, especially in vessels which trade to the tropics, and have to use sea water for circulating purposes, which would cause trouble if iron pipes were used in the condenser, as would be necessary if ammonia were used.

As the conditions in an engine room are hardly what may be termed ideal for the installation of a refrigerator plant, particular attention should be paid to the question of the rated capacity of the machine, the lagging of the brine tank, the insulation of water end of brine pump and brine pump leads, if brine circulation is employed.

CO₂ machines are now very reliable. The difficulties which used to occur, due to the higher pressures used as compared with ammonia, have practically disappeared.

Another important advantage is that the CO₂ gas, which these machines use, can now be obtained all over the world, this gas being used for so many other purposes in addition to refrigeration.

As showing the reliability of the present day machines, the author has particulars of forty steamers fitted in one fleet which have refrigerator machines fitted under the conditions named, the machines being fitted with a single compressor, and for a period extending over the last twelve years, in no single instance has a machine broken down and spoilt the provisions in the chambers. Of course, in passenger steamers, where this question is more important, duplex machines are always fitted, thereby minimising to a great extent the possibility of a breakdown.

The most important point in carrying fresh provisions is the chambers in which they are stored. To quote an engineering simile—it is no use providing a first-class air compressor, which has the highest efficiency possible, if it is compressing air into a receiver which is leaking badly, and that is what happens very often in the fitting of refrigerator chambers in a steamer. Considerable care is

exercised in obtaining a machine of high efficiency, but sufficient care is not always bestowed on the chambers themselves.

In the carriage of ships' provisions, which are various, many difficulties arise which do not occur in the carriage or storage of other refrigerated produce.

In the first place, it is necessary to provide accommodation for a great variety of goods carried, each requiring its own special conditions and temperatures. Space being valuable, that which is allotted for the building of the refrigerator chambers is generally cut down to the lowest possible limit. Great care, therefore, has to be taken in the arranging of these. Owing to the number of small items it is necessary to carry, it is not possible to hang everything up, which is, of course, the ideal condition. Meat, for instance—owing to the difficulty in cutting up meat when placed in the refrigerator in large pieces, it is sometimes found preferable for the meat to be cut up into joints before being frozen at the cold storage on shore. Each joint is wrapped up in a separate cloth, which keeps it cleaner and prevents waste.

Galvanized shelves are generally provided round three sides of the chamber. The shelves are built up with angle iron framing, ordinary bead iron widely spaced being riveted in position, forming a tray and supported on iron tubes. They are portable and easily cleaned.

The chambers also require to be entered daily for taking out the provisions necessary for the day's supply, the doors often being left open longer than is absolutely necessary.

A trunk hatch is generally provided from the deck to the outside of cooling rooms, with an electric winch easily handled for lifting the goods.

In large passenger steamers a separate chamber is provided for each item carried, such as beef, mutton, game, milk, butter, &c., as many as twenty to thirty chambers being provided—special chambers being even provided for the carriage of cut flowers for table decoration. In addition to the foregoing cold cupboard, cold larders, water coolers, wine coolers, &c., are frequently fitted.

In small installations as fitted to cargo vessels, four chambers are usually provided—meat, fish, vegetable and cooling room. This latter also acts as an air lock for entrance to the other chambers.

Another important item is the providing of sufficient cooling rooms, as it is found to be just as important that the meat should be thawed very slowly after being taken from the freezing chambers, as what it is to keep it at the right temperature when it is in the chambers.

The temperatures vary according to the number of chambers that are provided and the class of goods carried in them. The following temperatures are generally worked to:—

Meat chambers	24 Fahr.
Fish, game and butter chambers	26 ..
Milk chambers	36 ..
Vegetable rooms, mineral rooms, &c.	40° ..

"REFRIGERATOR TAIN."

The majority of us, who have tasted provisions which have been stored in a ship's chambers, have experienced what is called a "refrigerator taint," especially steamers homeward bound from the tropics. This is generally due to the construction of the chambers, wood lining being mostly used for the retention of the insulation. When new, this taint is not often experienced, but when the chambers have been in constant service the woodwork gradually becomes impregnated, and great care has to be exercised to prevent the contents becoming tainted.

In drawing attention to this matter, the author does not wish to infer that the goods are tainted in the ordinary sense of the word, but that they have a characteristic taste or smell which makes it possible to tell that the provisions have come from a refrigerator chamber. This is more especially the case when it is not possible to provide a separate chamber for each class of goods carried.

If the chambers could always be kept in a chilled state, no doubt this would not occur, but as is well known, on arrival of a steamer, it is necessary to empty the chambers before the refrigerating machine is stopped. The frost which has formed on the pipes then thaws,

and the chambers become exceedingly moist, due to the rising temperature which takes place. This causes the wood to become soft and porous; eventually it absorbs an unpleasant odour, which can be easily detected on entering a chamber which has been in service for some time.

After the chambers are stored—at the commencement of the voyage—and the doors closed, there is practically no air circulation, the same air being retained for the whole voyage; it becomes foul from various causes, and this condition helps very considerably to affect the chamber and the provisions stored therein. Fish rooms, because of the nature of the goods carried, are more liable to be affected in this way, and therefore they are sometimes tiled on the roof and sides, the floor being, of course, leaded. Whilst this overcomes the difficulty, it is expensive, and if part has to be removed to examine the insulation it is inconvenient, and the renewal of the tiling costly.

Owing to their position in the steamer and the construction of refrigerator chambers, it is exceedingly difficult to thoroughly ventilate them when empty. To overcome this difficulty, several schemes have been tried.

Removable plugs are often fitted, so that communication may be effected one chamber with another, thereby inducing a current of air through the different chambers.

The author has experimented with deodorising machines, and the results have been very satisfactory, but at the best, it is only a cure and not a solution to the difficulty.

The foregoing remarks apply to chambers fitted with brine grids, which is the common practice in ships' provision chambers, the usual allowance for grid surface being as follows:—

Below 32 degrees—

Meat, fish, &c. ... 25 sq. ft. per cubic foot of chamber.

Above 32 degrees—

Mineral, vegetable, &c. 20 " " " "

In the carriage of refrigerated produce, the best results are obtained where a circulation of cold air is employed, the disadvantage of this system in small installations being that it necessitates the refrigerator machine running practically continuous.

With the brine grid system, owing to the reserve of cold brine in the grids, it is possible to design the plant so that it is only necessary to run the refrigerator machine at two periods of four hours each per day of 24 hours. The best system, therefore, is a combination of cold air circulation and brine grids, and the results obtained by this method are much superior to those where only brine grids are employed. This combination is accomplished by fitting the usual brine grids in the chambers, and, in addition, two batteries of brine grids, each provided with an electric fan for circulating the air through the chambers, one battery being in use whilst the other is employed in thawing off the frost which deposits on the pipes of the battery from the moisture in the air. In small installations one battery would be sufficient, the air being circulated whilst the machine is running, and being used for thawing purposes when the machine is stopped.

The air circulation alone can also be utilised, when the chambers are empty in port, for ventilating, and also for drying purposes, before the chambers are stored for the ensuing voyage.

What, therefore, should be the ideal conditions for refrigerator chambers?

1. The insulating material must have a low coefficient of conductivity at the temperatures employed.

2. The insulation material, and the lining of the sides, roof, &c., must be of an unabsorbent material.

3. They must be sanitary and capable of being washed out with a hose.

4. The insulating material must be adaptable to the shape and position of the chamber.

5. It must be easily removable for inspection of insulation and of ship's structure when necessary.

6. It must be capable of being thoroughly ventilated for the purpose of completely drying the chambers before they are stored.

7. It must be rat and vermin proof.

INSULATING MATERIAL.

When one starts to look for reliable data in connection with insulating material, it is generally found that the tests on this material have been carried out in either of two ways—the one test being the transmission of heat at high temperatures, which is not reliable when one is dealing with low temperatures, and the other method is by what is termed the "ice box" system.

A box is constructed of wood, which is insulated with the material required to be tested—the box is previously cooled to the required temperature, and a certain quantity of ice, which has been carefully weighed, is placed in the box, and the box closed up. The amount of water draining from this box is carefully weighed and checked, and at the expiration of a certain time the remaining quantity of ice is also carefully weighed and the results tabulated.

In testing material under these conditions, the temperatures inside the box will probably be in the region of 34 deg., and the temperature of the outside air will be about 60 deg., giving a difference between the inside and the outside of the box of only 26 deg.

Material tested under these conditions necessitates the experiment being carried on for a considerable number of days to obtain a comparison between one material and another. The differences obtained are not pronounced enough for practical purposes.

Instead of making a wooden box, a steel chamber should be made. This chamber should then be lined with the insulating material it is required to test, and the temperature brought down inside this chamber to the corresponding temperature at which these chambers are generally run at, say 20 deg. to 24 deg. Fahr. This steel chamber should be placed in a room in which the air could be raised to a temperature of 120 deg., which is a condition which often arises in actual practice, as, for instance, in the case of the insulation on the side of a steamer—when you have the heat of the sun on the outside steel of the vessel and a temperature of 20 deg. to 24 deg. the other side of the insulation. The temperature of the holds where these chambers are placed is also considerable when certain cargoes are carried.

When the best insulating material is found to meet these conditions it can then be tested with different thicknesses, and reliable data would be obtained which could be utilised in designing an insulation.

In a chamber 12 ft. square by 7 ft. in depth, fitted with insulation, each inch which the total thickness of insulation and lining can be reduced represents nearly 50 cubic ft. In a steamer fitted for refrigerated cargoes, this would represent several tons increased carrying capacity.

At the present time there is a great diversity of opinion which is the best insulating medium, and also which is the best thickness to be fitted, each refrigerator expert holding different opinions.

Professor W. M. Thornton, Newcastle-on-Tyne, read a paper on "Insulation for Refrigerator Rooms," in 1914. He stated, "there is probably less reliable information on the thermal conductivity of poor conductors at low temperatures than upon any other engineering subject of equally wide application."

He gave the results of tests which had been carried out with silicate cotton, baked cork, granulated cork and charcoal. As a result of these tests, it would appear that silicate cotton is the best insulation medium for high temperatures, such as are experienced with temperatures corresponding with steam pressures, and that compressed carbonised cork is the best insulating medium for low temperatures.

He also stated: "The lower the specific heat, the quicker the temperature of the refrigerator rises or falls. The insulation of a refrigerator room should have a high specific heat so as to prevent too sudden a variation of load on the carrying machinery when the external thermometer rises. The thermal capacity of the installation is in fact the ..."

In considering the value of an insulating material for use in a steamer, various factors have to be taken into consideration. The materials which have been employed for this purpose are bran, sawdust, charcoal, silicate cotton, granulated cork, compressed cork, &c.

Silicate cotton, for instance, which is used largely for this purpose, has a great affinity for moisture, and great care has to be exercised to prevent this material becoming damp, as it then acts as a conductor of heat instead of a non-conductor, besides being detrimental to the ship's structure.

The motion and vibration of the steamer also requires to be taken into account, as this causes settling where a loose material which requires packing in place is employed.

To meet the conditions laid down regarding the requirements in constructing a chamber for use in a steamer, it would appear that compressed baked cork is the best insulation of all those which can be profitably employed, and it has the advantage of economy of space and of remaining in the same condition for an indefinite period.

The wood lining which is at present used, also requires to be done away with. This can be effected by using a special composition and cement in conjunction with compressed cork, thereby providing a chamber which fulfils all the conditions laid down.

This system has been used in America for shore installations, but has not been adopted for ship work owing to the danger of the cement cracking, due to the working of the vessel.

There has recently been introduced a method which gets over this difficulty by fitting this combination on the Unit system. The cork is made up in slabs of convenient size, built up of small pieces of cork of irregular size, heated under pressure until the temperature causes the material to change colour. When this occurs, these pieces become slightly cemented together by the gummy matter contained in the cork, and the result is a solid mass of fair mechanical strength. This slab, which is about 2 ft. square, and 2 in. thick, is then placed in a frame, and a special composition is applied about 1 in. thick, the last $\frac{1}{2}$ in. being a hard non-porous cement, which gives it a stone-like finish. The cork adheres to the composition firmly, the result being a combination slab which can be handled like a piece of wood, but of greater strength.

In fitting this system the side of the vessel is first coated with hot bitumen. Slabs of cork are then placed in position, the number and thickness depending on the depth of insulation required. The combination slab is then placed in position, a special joint being made between the combination slabs. This joint is formed as follows:—The edge of the cement is fitted with a chamfer inwards to form a dovetail with the cement next to it. This dovetail is filled with a special cement, the whole being held to the main structure by beading iron and bolts.

The joints of the various cork slabs are, of course, arranged to be covered by the slabs immediately over it, and so form practically a continuous insulation. The corner pieces are made and projections covered in a similar manner, as will be shown later.

One of the first chambers fitted on this principle was fitted by the author in a steamer going to the tropics. This chamber was arranged for carrying meat, and was situated between the ship's side and the engine room. Naturally, being in this position, considerable difficulty was experienced in keeping the required temperature, the heat of the engine room being on one side and the heat of the sun on the ship's side on the other.

On the deck immediately above this chamber the engineers' accommodation was situated, and trouble had been caused due to the sweating action which took place on the floors of these rooms when hot weather was experienced.

Owing to the deterioration of the woodwork it became necessary to re-insulate this chamber. The question of the insulating material to be used was carefully considered, and it was decided to fit compressed cork on the slab system of insulating, thereby doing away with all timber, as it was felt if the results anticipated were realised it

would be an excellent test. The 12-in. silicate cotton was replaced by using the prepared slabs, all woodwork being done away with excepting for the door. Careful attention was paid to the results obtained from this chamber, and it was found to be perfectly satisfactory in every way.

Another important consideration in the fitting of provision chambers, where the engineer on watch has to look after the running of the insulation, is the question of temperatures.

TEMPERATURE RECORDS.

It is generally most convenient to place the refrigerator chambers in the hold next the after part of the engine room, as this shortens the length of brine pipes. The most convenient position, however, for the refrigerator machine is on the starting platform at the bottom of the engine room, which is a considerable distance from the refrigerator chambers, owing to the after bulkhead of the engine room always being a watertight bulkhead. Various long distance thermometers have been brought out to overcome this difficulty. One of this type gives very satisfactory results, and it is now possible to place a board alongside the refrigerator machine with a thermometer connected to each refrigerator chamber by means of a flexible pipe, and the engineer who is in charge of the refrigerator machine can see exactly what the temperatures of the refrigerator chambers are without leaving the starting platform. One steamer, which has been fitted over twelve months, has been carefully checked by means of tested thermometers, and the greatest variation noted has been half a degree between the temperature taken with the tested thermometer and that recorded in the engine room, this result being quite accurate enough for the purposes for which they are employed. This small difference might be due to an error in taking readings with the tested thermometer.

The actual length of the connecting tubes in the particular ship referred to between the thermometers in the engine room and the refrigerator chambers varies between 60 ft. and 110 ft.

The flexible tubing is armoured and may be clipped to the bulkheads the same as an ordinary electric wire, the differences in temperatures through which this flexible tubing passes being compensated for.

Another important consideration is the transfer of meat, &c., from the storage room on shore to the ship.

When it is intended to carry meat in a frozen state it is, of course, necessary that it should be thoroughly chilled or frozen before it is placed in the chambers on board the vessel. This is done by the refrigerator installation on shore. The facilities, however, provided for transferring this meat from the shore store to the steamer are inadequate and inefficient. It may often be observed on a hot summer's day, a lorry full of frozen meat being taken down to a steamer with only a tarpaulin stretched over it, which means there is a good deal of luck whether the meat will turn out satisfactory after being placed in the ship's chambers or not.

The author thinks that it is quite agreed that if meat has been frozen, if it is once allowed to thaw, even slightly, on being frozen up again it invariably becomes covered with a green mould, or if it does not go this far the taste is affected. Efficient means, therefore, should be provided in the way of insulated wagons for the transfer of ships' provisions from a cold storage to the ship. At present, a few insulated wagons are used for this purpose, but they are only a makeshift, consisting of insulated boxes on a lorry, the insulation provided being very poor, there being no method provided for cooling the interior of the boxes before the goods are transferred to them, the hot air which is in these boxes having to be cooled by the cold goods, which are placed in the same, the only advantage being that they do prevent the sun directly striking on the goods.

LIGHTHOUSE ON AMAPALA POINT.—The Government of Salvador have placed a lighthouse on Amapala Point at the entrance to the Bay of Fonseca. The lighthouse is 30 metres above sea-level, and exhibits a flashing white light of five seconds' duration every five seconds.

REPAIRING GERMAN SHIPS BY ELECTRIC WELDING.

Last week we published from the November issue of the *Journal of the American Society of Naval Engineers* a summary of an interesting contribution by Commander E. P. Jessop, U.S.N., showing how the damaged machinery of German ships seized by America was repaired by acetylene welding. In the same issue of our contemporary, a short note by the editor of the journal covers some illustrations of the boiler damage to the *Pommern*, and Naval Constructor H. G. Knox dealt with the main engine cylinders of the German ships *Neckar*, *Rhein* and *Bulgaria*. We publish these below.

from the cash value, the military value of the vessel—for every ship to-day has at least a potential military value—the cost and time required to effect the necessary boiler repairs and replacement would surprise the agents that so carefully thought out the campaign of vandalism on the German vessels seized in this country.

Naval Constructor H. G. Knox, U.S.N., contributes the notes on welding the main engine cylinders of the German ships *Neckar*, *Rhein* and *Bulgaria*. Their main engine cylinders, he points out, had been badly damaged by the German crews just prior to seizure of the ships by the United States Government. The ships are all twin screw and equipped with quadruple-expansion engines of the usual marine type. Of the 24 cylinders on the three ships, 17 were



Two Illustrations of the Damage done to the *Pommern's* Boiler.

The photographs illustrating the boiler damage on the *Pommern* are introduced by a short note by the editor of the *Journal*, in which he says that the ss. *Pommern*, now the *Rappahannock*, was interned at San Francisco. When it was decided to put her in service a survey of the vessel disclosed the fact that of four Scotch boilers on the vessel, only one could be repaired. It was necessary to renew the other three.

The photographs give some idea of the nature of the damage. The boilers were ruined by dry firing. Not satisfied with the results of this treatment, it appears that thermit or some kindred agent was employed to complete the vandalism.

The net result, however, was negligible. Considering, quite aside

damaged. Of this number 15 required welding. This applied to the cylinders proper. In addition there were several broken fittings and cracked cylinder liners. In the course of repairs the only casting which was made complete was one low-pressure valve-chest cover, which was so badly broken as not to warrant repair.

On the *Bulgaria* the two high-pressure cylinders were damaged by having the flange to the main steam inlet nozzle broken. These two cylinders were repaired by machining off the broken flanges and threading the nozzles with a fine thread for about 2 inches. Steel-plate flanges were turned, threaded and fitted to the nozzles. No welding was required on these cylinders, and the job tested satisfactorily.

A brief description of the welding effected on the other cylinders is given as follows:—

"NECKAR" (U.S.S. "ANTIGONE").

Port high.—A cast-steel patch about 48 in. long, including the cylinder wall and top flange of the cylinder, was first arc-welded in place. The cylinder was then finished up and tested to 200 lb. hydraulic pressure. The patch leaked to such an extent that even with caulking it was impossible to make the patch tight. This patch was then cut out below the weld and a cast-iron patch acetylene-welded in place. This patch was about 60 in. long and developed no leaks when tested.

Starboard high.—A 32-in. cast-iron patch was acetylene-welded in this cylinder and a section of flange 39 in. long was also welded in place.

Port first intermediate.—A narrow cast-iron patch, including the top cylinder flange, was acetylene-welded in this cylinder.

Starboard first intermediate.—A cast-iron patch 51 in. long, including the top flange of the cylinder, was acetylene-welded in this cylinder.

Port second intermediate.—A 54-in. break was repaired by a cast-iron patch in the top cylinder wall. A 36-in. section of flange was also acetylene-welded in place. A piece broken out of the cylinder casting in the slide-valve space was electric-welded. This break was about 24 in. long.

Starboard second intermediate.—A large section of cylinder wall was broken out of this cylinder. The seam in the cast-iron patch was 102 in. long, acetylene-welded. One pin-hole developed on test and was plugged. No other leaks developed. Two 16-in. sections of flange in rear of lugs were also welded in place. One 9-in. piece was broken out of slide-valve seat and acetylene-welded.

Port low.—Two broken pieces of cast iron, of about 28 in. each, were electric-welded on the top end of the cylinder over steam port. One section broken out of cylinder casting next to slide valve was also electric-welded. This patch was about 24 in. long.

Starboard low.—The starboard low-pressure cylinder was broken in a similar manner to the port. Two pieces, each 28 in. in length of weld, were welded in top end of steam port, and a 24-in. section in the valve-chest wall. All of these welds were made by electric arc.

Steam line elbows.—Two sections of flange, 9 in. long each, were acetylene-welded in cast-iron high-pressure steam-line elbows. The broken pieces were rewelded in place.

"RHEIN" (U.S.S. "SUSQUEHANNA").

Port high.—A comparatively small patch was welded at the upper end of this cylinder, and included a section of flange. An axial crack extending 6 or 8 in. from the crack was also included in the weld. The total length of the weld was about 28 in., and was made by acetylene.

Starboard high.—Undamaged.

Port first intermediate.—A 38-in. cast-iron patch was acetylene-welded, and included a section of flange. One small pin-hole developed on test and a screw plug was inserted.

Starboard first intermediate.—Undamaged.

Port second intermediate.—A 46-in. cast-iron patch, including a lug, was cast in iron and welded in place by acetylene. The liner of this cylinder was broken in pulling out of cylinder and an 8-in. length of patch welded in top edge of liner. The only leaks developing on test were a pin-hole in the weld and a leak in the casting outside of weld where the lug was not sufficiently filleted. Both leaks were easily closed without welding.

Starboard second intermediate.—A large cast-iron patch, including a lug, was acetylene-welded as shown in photograph. The main break was 73 in. long, and in addition two 13-in. sections of flange and an 8-in. section of cylinder liner at top similar to the port second intermediate were built up.

Port low.—A large cast-iron patch, including a section of top cylinder flange, was acetylene-welded in this cylinder. The length

of seam was about 80 in., and the weld was made by acetylene. The liner for this cylinder had an L-shaped crack extending from the top down and to the left, total length of crack about 27 in. This was welded by acetylene, as were also two 8-in. pieces broken out from the top edge of liner.

Starboard low.—A 73-in. cast-iron patch was acetylene-welded in this cylinder and a 19½-in. axial crack was acetylene-welded in liner.

"BULGARIA."

In addition to the two high-pressure cylinder nozzles repaired by screwing on new flanges, the port second intermediate cylinder on this ship had an extensive break. This was successfully repaired by arc-welding a cast-steel patch in place, also welding a jagged L-shaped break. The total length of weld was 127 in. Steel studs



"Bulgaria." Patch Clamped On.

were used to insure good connection between the cast iron and welded metal.

All cylinders requiring repairs were removed from the ship and welded in shop. This was deemed desirable both on account of easy welding and machining, and also so that complete inspection for flaws of any kind could be made on test. After welding the cylinders were bored and cover studs fitted in shop. Cylinder covers were then fitted, openings blanked off and test applied. It was found that when a cylinder under test was completely filled with water most of the leaks developed without further pressure. In every case, however, before the hydrostatic pressure was applied the water in the cylinder was heated by steam to at least 150 deg. F. The usual hydrostatic test pressure of about 50 per cent. excess of working pressure was then applied as follows:—

High	100	..
First intermediate	125	..
Second intermediate	150	..
Low	50	..

After the hydrostatic test all cylinders were tested under steam, in the case of second intermediate and low-pressure cylinders to their working pressures, and in the case of high-pressure and first intermediates to 100 lb.

In none of the acetylene welds did any leaks, other than one or two pin-holes, show. In the arc welds leaks of various sizes developed

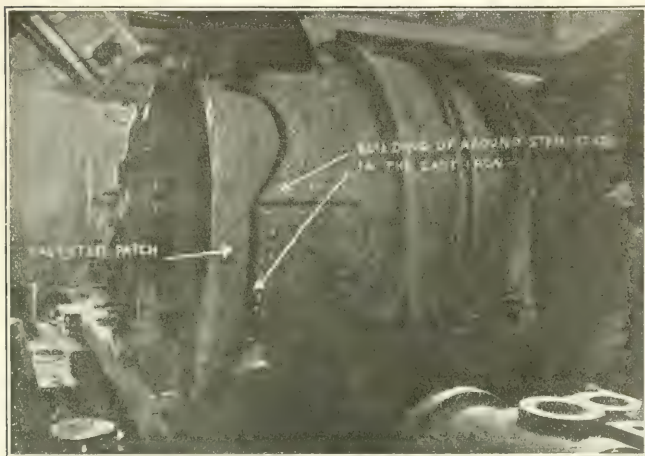
Acetylene welding is fundamentally different in application, and, while in arc welding every effort is made to keep the vicinity of the weld cool, in acetylene welding preheating is employed and the actual filling of the V slot is done in lengths of about 6 inches. The sides of the slot are actually fused with the torch and small pieces of welding rod and flux added to the puddled metal. Having built up 6 in. flush, another section of the same length is then fused and filled. On heavy cast iron the weld proceeds at about 8 in. per hour. By skilful manipulation of the torch and the use of flux most of the slag and other impurities are worked out of the weld. Cast-iron welding sticks are used for filling in.

In order to prevent after-cooling cracks in the metal near the weld it is necessary, in acetylene welding large bodies, to employ preheating. This is most satisfactorily done with a charcoal fire built under the break. In most of the cylinders this was started about four hours before the welding. The fire is kept going all the time during the welding and is allowed to die out in place when the weld is finished. In fact, when finished, the weld, fire and all, is covered up and slow cooling encouraged.

Another point required in acetylene welding is that owing to the fluid condition of the metal when the torch is applied it is necessary to keep the surface of the metal horizontal. In a cylinder, therefore, when the break is circumferential, it is necessary to mount the cylinder on rockers or, in some other convenient

way, make it possible to rotate it as the weld proceeds. The charcoal grate and cylinder on rockers is illustrated below.

As the foregoing brief description is primarily to illustrate the actual welds and not to go into the relative merits of the two methods of welding, no further discussion on that point is offered. The



Studding Device as used with Arc Welding.

in practically all welds, and were closed by rewelding or caulking. The large weld in the *Bulgaria*, for example, was tested four times before passed as tight. In every case the leak was between the welded metal and the cast-iron cylinder wall. No leaks showed where the welded metal joined the cast-steel patch.

In preparing the cylinders for either arc or acetylene welding the jagged edge of the break was first smoothed off and then bevelled to approximately 45 deg.; wooden patterns representing the patch were then fitted to the break in the cylinder and a cast-iron or steel patch made from this pattern. The cast-iron or cast-steel patch, after cleaning, was fitted to the cylinder and bevelled to approximately 45 deg. on the welding edge. The patch was then clamped in place for welding.

When arc welding was to be used all cast-iron edges adjacent to the weld were drilled and tapped for $\frac{1}{2}$ -in. studs spaced about $1\frac{1}{2}$ in. centre to centre. Two rows of studs, staggered, were employed, as shown above. The theory of using steel studs is that the weld will take hold of the studs without fail and thus assure a good hold on the cast iron. Studs were, of course, not fitted when acetylene welding was used.

With the patch secured in place the arc welding proceeded by first building up the edges of the V slot from one end to the other and then filling in between these steel-plated surfaces with the welding material. At no time during the weld was the adjacent metal allowed to become very hot. Over-heating induces shrinkage or cooling strains in the weld. These are particularly noticeable where the weld joins the cast iron. The welding material is steel wire for all arc welds.



Charcoal Grate and Cylinder on Rockers.

most important repairs to complicated breaks in 15 cylinders, besides many lesser parts, were successfully repaired, and that to-day three valuable ships are in service against a country that strove in vain to render these ships useless for months to come.

THE NEW ADMIRALTY BOARD.

The following are the names of the new commissioners appointed for executing the office of Lord High Admiral of the United Kingdom of Great Britain and Ireland :—

The Right Honourable Sir Eric Campbell Geddes, G.B.E., K.C.B.
Acting Admiral Sir Rosslyn Erskine Wemyss, K.C.B., C.M.G., M.V.O.

Vice-Admiral Sir Herbert Leopold Heath, K.C.B., M.V.O.

Rear-Admiral Lionel Halsey, C.B., C.M.G.,

Rear-Admiral Hugh Henry Darby Tothill, C.B.

Rear-Admiral Sydney Robert Fremantle, C.B., M.V.O.

Rear-Admiral Sir Alexander Ludovic Duff, K.C.B.

The Right Honourable Ernest George Pretymann.

Rear-Admiral George Price Webley Hope, C.B.

Sir Alan Garrett Anderson, K.B.E.

Arthur Francis Pease, Esq.

OPERATIONS AND MAINTENANCE.

With regard to operations and maintenance the following official announcement has been made :—

The Letters Patent for the New Board of Admiralty having now been issued, it may be desirable to summarise the changes in the personnel of the Board and to indicate briefly the alterations in organisation that have been decided upon.

Acting Vice-Admiral Sir Henry Oliver now brings to a close his long period of valuable service on the Naval Staff and will take up a sea-going command, being succeeded as D.C.N.S. by Rear-Admiral Sydney R. Fremantle. Rear-Admiral George P. W. Hope has been selected for the appointment of Deputy First Sea Lord formerly held by Admiral Wemyss, but with changed functions—Commodore Paine, Fifth Sea Lord and Chief of Naval Air Service, leaves the Board of Admiralty in consequence of the recent creation of the Air Council, of which he is now a member, and formal effect is now given to the appointment of Mr. A. F. Pease as Second Civil Lord, which was announced last Thursday.

In view of the formal recognition now accorded, as explained by the First Lord in his statement in the House of Commons on November 1, to the principle of the division of the work of the Board under the two heads of Operations and Maintenance, the members of the new Board (other than the First Lord) may be grouped as follows :—

Operations.—First Sea Lord and Chief of Naval Staff, Admiral Sir Rosslyn Wemyss ; Deputy Chief of Naval Staff, Rear-Admiral S. R. Fremantle ; Assistant Chief of Naval Staff, Rear-Admiral A. L. Duff ; Deputy First Sea Lord, Rear Admiral G. P. W. Hope.

Maintenance.—Second Sea Lord, Vice-Admiral Sir H. L. Heath ; Third Sea Lord, Rear-Admiral L. Halsey ; Fourth Sea Lord, Rear-Admiral H. H. D. Tothill ; Civil Lord, Right Hon. E. G. Pretymann, M.P. ; Contoller, Sir A. G. Anderson ; Second Civil Lord, Mr. A. F. Pease.

Financial Secretary, Right Hon. J. T. Macnamara, M.P.

Permanent Secretary, Sir O. Murray.

The principle of isolating the work of planning and directing naval war operations from all other work, in order that it may receive the entire attention of the officers selected for its performance, is now being carried a stage further and applied systematically to the organisation of the Operations side of the Board and that of the Naval Staff.

In future the general distribution of duties between the members of the Board belonging to the Naval Staff will be as follows :—

First Sea Lord and Chief of Naval Staff.—Naval policy and general direction of operations.

Deputy Chief of Naval Staff.—War operations in home waters.

Assistant Chief of Naval Staff.—Trade protection and anti-submarine operations.

Deputy First Sea Lord.—General policy questions and operations outside home waters.

The detailed arrangements have been carefully worked out so as to relieve the first three of these officers of the necessity of dealing with any questions not directly connected with the main operations of the war, and the great mass of important paper work and administrative detail which is inseparably and necessarily connected with Staff work, but which has hitherto tended to compete for attention with Operations work generally, will under the new organisation be diverted to the Deputy First Sea Lord.

The grouping of the Director of the Naval Staff Divisions will be governed by the same principle.

The only two Directors that will work immediately under the First Sea Lord will be the Director of Intelligence Division (Rear-Admiral Sir Reginald Hall) and the Director of Training and Staff Duties (Rear-Admiral J. C. Ley), whose functions obviously affect all the other Staff Divisions alike.

Under the Deputy Chief of Naval Staff will be grouped three Directors whose duties will relate entirely to the planning and direction of operations in the main sphere of naval activity, viz. :—

Director of Operations Division (Home).—Captain A. D. P. Pound, Director of Plans Division. Captain C. T. H. Fuller, C.M.G., D.S.O.

Director of Air Division.—Wing Captain F. R. Scarlett, D.S.O., together with the Director of Signal Division, Acting-Captain R. L. Nicholson, D.S.O., whose duties relate to the system of Fleet communications.

Under the Assistant Chief of Naval Staff will be grouped four Directors, whose duties relate to Trade Protection and Anti-Submarine Operations, viz. :—

Director of Anti-Submarine Division.—Captain W. W. Fisher, C.B.

Director of Mine-sweeping Division.—Captain L. G. Preston, C.B.

Director of Mercantile Movements Division.—Captain F. A. Whitehead.

Director of Trade Division.—Captain A. G. Hotham.

Under the Deputy First Sea Lord there will be one—

Director of Operations Division (Foreign).—Captain C. P. R. Coode, D.S.O.

The chief change on the maintenance side of the Board relates to the distribution of duties amongst the Civil Members. The continuance of the war has caused a steady increase in the number of cases in which necessary developments of Admiralty policy due to the war or experience resulting from war conditions give rise to administrative problems of great importance and complexity of which a solution will have to be forthcoming either immediately upon or very soon after the conclusion of the war. The difficulty of concentrating attention on these problems of the future in the midst of current administrative work of great urgency may easily be appreciated, and the Civil Lord has consented to take charge of this important matter, with suitable naval and other assistance. He will therefore be relieved by the Second Civil Lord of the administration of the programme of naval works, including the questions of priority of labour and material requirements arising therefrom and the superintendence of the Director of Works Department.

It has further been decided that the exceptional labour and other difficulties now attending upon the execution of the very large programme of urgent naval works in progress have so greatly transformed the functions of the Director of Works Department of the Admiralty that it is desirable, while these abnormal conditions last, to place that Department under the charge of an expert in the rapid execution of large engineering works.

The Army Council have consented, at the request of the First Lord of the Admiralty, to lend for this purpose the services of Colonel Sir Alexander Gibb, K.B.E., C.B., R.E., Chief Engineer, Port Construction, British Armies in France. Colonel Gibb (of the firm of Easton, Gibb, Son & Co., which built Rosyth Naval Base) will have the title of Civil Engineer-in-Chief, and will be assisted by the Director of Works, who retains his status as such, and the existing staff of the Department, which will be strengthened as necessary.

Another important change has reference to the organisation of the Admiralty Board of Invention and Research, and has the object at once of securing greater concentration of effort in connection with scientific research and experiment and ensuring that the distinguished scientists who are giving their assistance to the Admiralty are more constantly in and amongst the problems upon which they are advising.

Mr. Charles H. Merz, M.Inst.C.E., the well-known electrical consulting engineer, who has been associated with the Board of Invention and Research since its inception, has consented to serve as Director of Experiments and Research, unpaid, at the Admiralty to direct and supervise all the executive arrangements in connection with the organisation of scientific research and experiments. Mr. Merz will also be a member of the Central Committee of the Board of Invention and Research under the presidency of Admiral of the Fleet Lord Fisher. The functions of the Central Committee will,

THE TORPEDOED "REWA."

The loss of the *Rewa* was officially announced by the Secretary of the Admiralty in the following communiqué:—

"His Majesty's hospital ship *Rewa* was torpedoed and sank in the Bristol Channel about midnight on January 4 on her way home from Gibraltar.

"All the wounded were safely transferred to patrol vessels, and there were only three casualties among her crew, three Lascars being missing.

"She was displaying all the lights and markings required by the Hague Convention, and she was not—and had not been—within the so-called barred zone as delimited in the statement issued by the German Government on January 29, 1917."

Full details of this crime have already appeared in the press, and it is unnecessary, therefore, to dwell further upon them, suffice



The Torpedoed Hospital Ship "Rewa"

as hitherto, be to initiate, investigate, develop, and advise generally upon proposals in respect to the application of science and engineering to naval warfare, but the distinguished scientific experts at present giving their services will in future work much more closely with the technical departments of the Admiralty immediately concerned with the production and use of apparatus required for specific purposes.

The general arrangements in regard to the organisation of scientific research and experiment will in future come under the direct supervision of the First Lord.

ARMSTRONG CO. This company proposes to raise its capital to £125,000 and equip a new yard at Keadland for the construction of large wooden sea lighters and composite-built steamships of 1,000 tons displacement. It is hoped that the first vessel will soon be commenced.

It is to say that the *Rewa* is the sixth British hospital ship that has been torpedoed and sunk without warning.

Before the war, the *Rewa* was running on charter by the British Government as a troop ship on the Indian Service. In August, 1914, she was fitted out as a hospital ship and she has been employed in hospital service since then.

Built in 1906 by W. Denny & Bros., Ltd., the *Rewa* was a vessel of 7,308 tons, driven by turbines, and she was originally designed for the British India Company's mail and passenger service.

The *Rewa* was converted into a hospital ship when fitted out

by the Dalmatian firm, the owners of the Marshall works at Siem, on the lower Trave, has opened negotiations for the purchase of 14 acres of land for the construction of a shipyard.

GENERAL NEWS SECTION.

PERSONAL.

Mr. B. Pardoe Thomas was at a meeting of the Newport Harbour Commissioners elected as one of the shipowners' representatives.

Commander Wm. Henry Niles, R.N.R., R.D., a former dock-master at Swansea, who died on November 7 last left estate of the value of £1,785.

Major John Angel Gibbs, D.S.O., of the firm of Gibbs & Co., shipowners, Cardiff, who was killed in action on September 20, left property of the value of £69,475.

over the commercial side and organisation. Sir William Weir, on his appointment as Director of Munitions in Scotland, retired from active participation in his firm's business, and Mr. Richmond became a joint managing director. To his untiring energy, combined with that of Mr. C. R. Lang, is due the efficiency and promptitude with which the large volume of varied war work undertaken by the firm has been successfully carried through, and the honour conferred upon him is a direct recognition of his valuable services. Mr. Richmond is a member of the Institution of Naval Architects, member of the Institute of Mechanical Engineers, and member of the Institution of Engineers and Shipbuilders in Scotland. He has also contributed numerous articles to technical associations and the press, and a recent address on "Some Aspects of Labour and its



Sir Alexander Gracie, K.B.E.,
M.V.O.,

Chairman of the Fairfield Shipbuilding
& Engineering Co., Ltd.



Mr. John Richie Richmond,
C.B.E., J.P.,

Managing Director of G. & J. Weir, Ltd.,
Glasgow.



Mr. Harold E. Yarrow,
C.B.E.,

Director of Yarrow & Co., Ltd.,
Glasgow.

Sir Alexander Gracie, who has been made a Knight Commander of the British Empire Order, is one of the United Kingdom's most distinguished marine engineers. He is Chairman and Managing Director of the Fairfield Shipbuilding & Engineering Company, which has, under him, made many notable contributions to the British Navy and the world's mercantile marine, including battle-ships, battle cruisers, cruisers and torpedo craft—palatial liners, ocean-going passenger vessels of less size and power, but not lower degree, and speedy channel packets. Some very large-powered turbine installations have been provided by the company, and also the geared turbines for the two earliest new merchant vessels—the London & South Western Railway Company's *Normania* and *Hawtonia*—to be propelled by machinery of that type. The *Normania* and the *Hawtonia* were built at Fairfield. Since the outbreak of war, the company has, it is almost unnecessary to say, done a great deal of highly important war work. Sir Alexander Gracie was made M.V.O. after the *Indomitable's* memorable trans-Atlantic voyage with the present King on board. The *Indomitable* was built at Fairfield.

Mr. J. R. Richmond, C.B.E., J.P., Managing Director of G. & J. Weir, Ltd., engineers, Cathcart, Glasgow, who has been appointed a Commander of the Order of the British Empire, served his apprenticeship as engineer with the firm, and when the business was formed into a limited liability company he became a director, and took

Claims in the Engineering Industry" attracted considerable attention.

The many friends of Mr. Harold E. Yarrow will congratulate him upon the honour conferred upon him in being appointed Commander of the Most Excellent Order of the British Empire (C.B.E.). The eldest son of Sir A. F. Yarrow, Bart., Mr. H. E. Yarrow is a director of the firm of Yarrow & Co., Ltd., engineers and shipbuilders, Scotstoun, Glasgow, and formerly of Poplar, London, and he takes a very active part in the management of the business. This world-famous firm are builders of torpedo-boat destroyers, torpedo boats, submarines, and shallow draught vessels, and since the outbreak of war they have turned out many vessels of different types to meet the demands of the Navy, many of which are credited with possessing exceptional capabilities.

Mr. Charles Thomas Glanville, for many years senior partner of the firm of Nelson, Donkin & Co., shipowners, of 38, Great St. Helens, London, E.C., has relinquished his partnership as from December 31. Mr. Glanville has had 57 years of business experience, and is one of the best known of the older type of shipowners in the City. He has been chairman of the Legal and Indemnity Committee of the Shipping Federation, Ltd., and of the General Shipowners' Society, and also a director of the North of England

Protecting and Indemnity Association. Mr. Glanville has also been a member of the Baltic Mercantile & Shipping Exchange. The business of Nelson, Donkin & Co. will be carried on by Mr. P. B. Glanville in partnership with Mr. Tom Crafter.

Mr. J. H. Vickery, J.P., general manager of the Alexandra (Newport and South Wales) Docks & Railway Company, has been elected President of the Newport Chamber of Commerce.

The King of Norway has presented a silver cup to Captain McDonald, of the Limerick Steamship Company's vessel *Cralloe*, for rescuing 22 persons from a Liverpool vessel in the North Sea.

Mr. S. T. Martyn, Managing Director of Martyn, Martyn & Co., Ltd., shipowners, of Cardiff and Newport, has received intimation that his son, Captain E. S. Martyn, reported missing since November, has been killed in action.

Captain John Lothe, Master of the Norwegian steamship *Ellen*, of Haugesund, has been awarded a piece of plate by the Board of Trade, in recognition of his services to part of a shipwrecked British crew which he rescued in May last.

Captain Armand Chauvin, Master of the French steamship *Pacificque*, of Marseilles, has been awarded a piece of plate by the Board of Trade in recognition of his services to a shipwrecked British crew whom he rescued in June, 1917.

The death has occurred of Mr. Robert Woodliffe Simpson, shipowner, Hartlepool, at Harrogate, at the age of 66 years. He was a partner in the firm of Metcalfe, Simpson & Co., Ltd. The deceased gentleman was a respected figure in the commercial life of the Hartlepoons.

The death has taken place of Mr. Thomas Abbot Rycroft, at the age of 81 years. He was an old and esteemed figure at the Elswick Works of Armstrong, Whitworth & Co., Ltd., and held the position of Chief Accountant for many years. About seven years ago he retired into private life.

Captain James German, who has been made an officer of the Most Excellent Order of the British Empire, is the principal of the firm of James German & Co., Cardiff Docks. He has rendered invaluable service since the outbreak of war, and at present holds a staff position at York.

At the offices of the Lampart and Holt Line, Liverpool, recently, the Liverpool and Manchester staffs of that company presented a handsome silver tray, suitably inscribed, and a cheque for £50 to Captain Samuel Rogerson Taylor, upon his retirement from the position of head stevedore, wharfinger and acting master porter of that company.

Mr. Frank Everard Dixon, Chairman of Harris & Dixon, Ltd., shipowners, Gracechurch Street, London, E.C., Managing Director of the British Steamship Investment Trust, Ltd., and a director of the Durban Navigation Collieries, Ltd., who died on December 5, 1917, at the age of 43 years, left estate valued at £309,646, the net personalty amounting to £268,759.

Mr. W. St. David Jenkins, Assistant Director of Navy Contracts, who since the outbreak of war has been stationed at Cardiff, has been presented by the Italian Government's representatives with a letter from the Italian Minister of Foreign Affairs, conferring upon him the Cross of the Cavaliere of the Italian Crown. The decoration accompanied the letter.

Karl H. Ziese, of the Schichau yards (Elbing, Danzig & Pillau), died on December 15 last at the age of 70 years. Ziese was a pioneer in many branches of German engineering. In 1874 he built the first compound marine engine for German gunboats. He also built the first German quadruple-expansion engine and compound locomotive. The floating dock at Pillau was built in 1889; the Diesel yard in 1890; and steel foundry at Elbing in 1897.

Mr. W. H. Parkinson, a very familiar figure on 'Change at the Quayside, Newcastle, has been congratulated by the local Chamber of Commerce on attaining his business jubilee in the City. He is fitter to the Harton Coal Company.

The Lord Mayor of Newcastle (Sir George Lunn), who recently resigned his seat on the Tyne Improvement Commission as a shipowners' representative in consequence of absence of the necessary tonnage qualification, has been re-elected to that body as a representative of the Newcastle City Corporation in succession to the late Sir Walter Plummer.

Sir Joseph Davies, upon whom the King has conferred the honour of Knight Commander of the Order of the British Empire, is a Cardiff docksman. For a number of years he was secretary of the South Wales and Monmouthshire Coal Freighters' Association. He is the senior partner of Joseph Davies & Hailey, who are the secretaries of the Cardiff Coal and Shipping Exchange.

Lieutenant-Colonel Adrian Charles Gordon, D.S.O., a member of the Baltic Mercantile and Shipping Exchange, and junior partner in the firm of R. Gordon & Co., steamship brokers, of 36, Lime Street, London, E.C., was killed in action in France on December 12. He was only 27 years of age, and was the second son of Mr. Charles W. Gordon, a former president of the Chamber of Shipping of the United Kingdom.

Mr. William Nesbitt, who has been 52 years in the service of the Tyne Improvement Commission, 30 years of which has been spent as bridge master at the Swing Bridge, Newcastle, has retired. During his long career, he has witnessed many important developments on the river, most of the shipping expansion in the upper reaches of the Tyne having taken place during the period he has had charge of the Swing Bridge.

Mr. Campbell Halmø, who took over the duties of Principal Surveyor to Lloyd's Register of Shipping at Liverpool on New Year's Day, is a native of Glasgow, and served his apprenticeship as a shipbuilder with Barclay, Curle & Co. On the completion of his apprenticeship, and with a view of extending his experience, he served in other shipbuilding establishments, namely, Robert Napier & Sons, and the Fairfield Shipbuilding Company on the Clyde, the Naval Construction and Armaments Company at Barrow, and Palmers Shipbuilding and Iron Company on the Tyne. He was appointed to the surveying staff of Lloyd's Register in 1890, and has been stationed for varying periods at Belfast, Glasgow, Sunderland, Newcastle, and London, from whence he comes to Liverpool to succeed Mr. Williamson, who has just retired.

Mr. Thomas Trevitt, agent of the Clyde Shipping Company, Ltd., at Liverpool, has retired as from December 31 last. Mr. Trevitt's long association with the Liverpool and Waterford steamship service, which became incorporated with the Clyde Shipping Company in 1912, made him a well-known figure in shipping circles. He joined the Waterford Company in 1863, and succeeded the late Mr. G. K. Payne as Liverpool agent in 1903. During his 54 years' service he materially assisted in the development of the trade between Liverpool and the Irish port. Mr. Trevitt is succeeded at Liverpool by Mr. McAlpine, who has been assistant agent since the absorption of the Waterford Company five years ago. Mr. McAlpine is the hon. secretary of the Advisory Committee which deals with the weekly labour connected with the coastwise trade of the port of Liverpool.

FORTHCOMING EVENTS.

LIVERPOOL SOCIETY OF ENGINEERS. Wednesday, January 23, meeting at Royal Institution, Colquhoun Street, Liverpool. Paper by Mr. Harold Wainwright, "The Design and Construction of Engines."

INSTITUTION OF CIVIL ENGINEERS. Thursday, January 24, meeting at the Institution of Civil Engineers, Great George Street, Westminster, S.W., at 6 p.m. Mr. F. G. C. Baldwin (Associate Member), on "The Effect of the Tyne Improvement Commission."

THE BRITISH EMPIRE ORDER AND THE MERCANTILE MARINE.

On the recommendation of the Board of Trade,* the British Empire Order (Fourth Class) has been awarded to the following officers of the Mercantile Marine, whose gallant services will be understood and appreciated from the details given:—

1. Captain EDMUND BURTON BARTLETT.—Has been in command during the war of a steamship and has carried a series of important cargoes. His ship has twice been encountered by enemy submarines, and by skilful handling of the vessel Captain Bartlett compelled them to break off their attacks.

2. Captain NEIL MCNEIL.—In command of a ship conveying troops, passengers and cargoes to and from this country throughout the war without mishap, and by conspicuous ability he evaded capture by the German raider *Emden* and later escaped attacks of enemy submarines.

3. Captain WILLIAM JOHN DAGNALL.—Has been sailing since the early days of the war in several of the largest vessels of his Company; he has rendered important services to the country, and on two occasions succeeded in saving his ship from being sunk by German submarines.

4. Captain THOMAS MCCOMB TAYLOR.—Has been throughout the war the Master of one of the principal ships of his Company, and has made a large number of voyages through the danger zone, conveying military forces and valuable cargoes.

5. Captain PETER MCLEAN.—Has been in the service of his Company for over 20 years, and since the outbreak of the war has carried many thousands of tons of munitions of all kinds and of foodstuffs.

6. Captain DAVID TAYLOR (a Master).—Has had a sea service of over 30 years, and during the war has been engaged in transport work. He was mentioned in despatches for good services whilst employed on transport duty.

7. Captain JOHN THOMAS.—Immediately before the declaration of war Captain Thomas's ship, which was owned by Evan Thomas Radcliffe of Cardiff, was discharging a cargo at a port in Germany; but in spite of the greatest difficulties he succeeded in getting her clear of German waters without being stopped, and eventually brought her safely to Cardiff. Since that time he has been in charge of a new steamer, and by his skill saved her on one occasion from a determined submarine attack. In 1892, when serving as chief officer of a British steamer, he took charge of the lifeboat of the vessel and rescued the entire crew of an American brig; for this action he was presented by the then President of the United States with a gold watch and a gold medal.

8. Captain ERNEST WILLIAM BASTARD.—Has been a Master in the service of his Company for 20 years, and throughout the war has been passing through the danger area, carrying many important cargoes for the Government. A ship of which he was in command was recently torpedoed by the enemy, but he got the whole of the ship's company away in safety, and is now the master of another vessel which has been sailing through the war zone.

9. Chief Engineer JAMES ALLAN.—On the occasion of his ship being torpedoed, Mr. Allan rendered conspicuous service in his efforts to save her, and when these proved to be unavailing, he saw to the safety of all his staff and was one of the last to leave the ship as she sank. All the boats had left, and he was taken from the water after the lapse of several hours in an exhausted state.

10. Chief Engineer THOMAS ANDERSON BOWMAN.—Was chief engineer of the *Belgian Prince*, which was sunk by a German submarine on July 31 last in circumstances of exceptional cruelty. Mr. Bowman was one of those who had been taken on board the submarine when she dived and threw the British prisoners into the water after the majority had had their life belts taken from them. Mr. Bowman was in the water from about 9 p.m. on the Tuesday night until about 6.30 a.m. on Wednesday morning, August 1, when he was picked up by a British patrol vessel.

11. Chief Engineer THOMAS GOWANS (Senior Chief Engineer of his Company).—Was chief engineer of a transport during the Boer War and was awarded the transport medal. He has been serving in a similar capacity in some of the principal vessels of his Company since the early days of the present war, and on two occasions the ship of which he has been chief engineer has been saved from destruction at the hands of the enemy.

12. Chief Engineer ARTHUR EDWARD PHILP (Senior Chief Engineer

of his Company).—Has been chief engineer, with the rank of engineer commander, Royal Naval Reserve, of an auxiliary cruiser, and since then has been occupied on transport duty.

13. Chief Engineer WILLIAM GRANT.—Has been employed by his Company for 40 years, and has been sailing since the outbreak of the war through the danger zone as chief engineer of some of his Company's largest vessels.

14. Chief Engineer JOSEPH MCFARLANE.—Has been engineer in charge of an important vessel which has been trading through the danger area during the war until a recent date when she was attacked and sunk by the enemy.

15. Chief Engineer ALFRED EVANS KELLY.—Has been in the employ of his Company for many years, and has rendered able service at sea throughout the course of the war.

16. Chief Engineer JAMES FOSTER.—Has served for a long period with his firm in the capacity of chief engineer, and has done valuable work as chief engineer on their vessels during the war.

17. Captain JOSEPH BARLOW RANSON.—Captain Ranson is senior captain in his Company, has been in command throughout the war of some of the most important of his Company's steamships, and has carried mails and series of large and valuable cargoes through the danger zone.

18. Captain WILLIAM THOMAS TURNER.—Captain Turner of the Cunard Steamship Company, Liverpool, was the commander of the *Lusitania* when that vessel was torpedoed by the enemy, and he subsequently went to sea again in charge of a ship on Government service which also was torpedoed by a German submarine. He again took service in command of another ship of which he is still acting as master.

19. Chief Engineer FRANK WILLIAM RUDDLE.—Mr. Ruddle has been throughout his career in the service of the White Star Line, Liverpool. He was chief engineer on the *Arabic* when she was sunk by torpedo by the enemy. He succeeded in leaving the vessel in one of the last boats which were launched and managed to pick up some of the survivors. Subsequently he has been serving in other vessels of the same line which have carried mails and cargoes through the danger zone.

20. Chief Engineer JAMES MACDONALD.—Mr. Macdonald sailed as second and third engineer of the *Mauretania*, Cunard Line, for a number of years before the war, and at the outbreak of war was senior second engineer of the *Carmania*, and was serving in that capacity when she engaged and sunk the German *Cap Trafalgar*. Since that time he has been chief engineer on the Cunard Company's vessels and has made a large number of voyages through the danger area.

WAGES IN THE SHIPBUILDING AND MUNITION TRADES.

It is officially announced that the Cabinet have decided that the settlement of any claim arising from the recent Orders granting an advance of 12½ per cent. to plain time workers in the shipbuilding and munitions trades shall be referred to the Ministry of Labour, in place of the War Cabinet Labour Committee.

Following this decision, the Minister of Labour received the following resolution, in which the Minister of Munitions concurs:—

"That this Committee of Trade Union representatives in the shipbuilding and engineering trades advising the Minister of Munitions request the Minister to represent to the Minister of Labour, who, they understand, is now charged with the settlement of the 12½ per cent. question, that the following should be the terms of settlement:—

"1. That the 12½ per cent. shall be extended to cover time workers who have not yet received the advance in the shipbuilding and munitions trades.

"2. That so far as the pieceworkers in these trades are concerned no 12½ per cent. shall be given, but that low piece prices shall be revised and that employers shall be given to understand that this is the decision of the Government."

The Minister of Labour proposes to deal with applications on the lines of this resolution, and under the procedure of the Munitions of War Act, 1915, Section I and Schedule I.

The applications which have already been received by Government Departments are so numerous that it is almost impossible for settlement to be arrived at within the 21 days from the date of reference to the Ministry of Labour, but this need not cause any uneasiness in the minds of the officials of the trade unions or the

* The President of the Board of Trade hopes to make further recommendations as opportunity offers.

workmen concerned. The arbitration tribunals have power to ante-date awards for such period as seems reasonable.

The Minister of Labour urgently appeals to all concerned to exercise patience. It is the duty of all to continue to make their best efforts. Stoppages of work will not help matters in the least, but will delay settlements.

This statement is made with the concurrence of the representatives of the workmen in the trade unions chiefly concerned, and the Minister sincerely hopes that a willing response will be made.

FROM OUR CORRESPONDENTS.

CLYDE DISTRICT.

(FROM OUR OWN CORRESPONDENT.)

The Fallen Quay Wall.—The work of clearing away the debris caused by the collapse of a section of quay wall at Glasgow Harbour is proceeding, and until this operation is completed, the Clyde Trust's engineers will not be able to make a report on the matter. Meantime the Trustees have decided that Mr. C. P. Hogg, C.E., Glasgow, be associated with their own chief engineer, Mr. Alston, in preparing a report on the accident. The Atlantic liners which were usually berthed at Plantation Quay before the collapse of the quay wall occurred are being accommodated elsewhere in the harbour. Some weakness of a similar nature to that seen at Plantation Quay has recently been observed behind the quay wall at Mavisbank, where a subsidence has taken place for a length of about 520 ft. The ground has now been made up to its original level.

Shipyards Canteens.—The announcement is made that an important conference will be held in Glasgow towards the end of the present month for the purpose of considering the establishment of canteens in shipyards and engineering and munition works in the Clyde area. Among the speakers there will be a number of large employers of labour in the district, and also Lord D'Abernon, Sir George Newman and Mrs. Winston Churchill. The main object of the conference, which is to be held on January 24 and 25, will be to elicit the views of employers, representatives of labour, public bodies, and others, as to the need for and the best means of encouraging the extension of canteen provision in large and small works and the best methods of managing such institutions. Towards the end of the proceedings the opinions and conclusions will be summarised by Lord D'Abernon and Sir George Newman. It is anticipated that some interesting information will be placed before the conference, as canteens have been successfully carried on in quite a number of Clyde shipyards for several years past.

Clyde Navigation Acts.—Just before the close of last year the Clyde Trustees lodged with Parliament a Provisional Order, seeking power to amend the Clyde Navigation Acts, 1858 to 1914, relating to rates, rents and charges. At the present time the rates and charges are fully up to the statutory maxima, and, under a special Order of the Board of Trade, certain rates are higher than the level stated in the Clyde Navigation Acts. The Board of Trade Order, however, will only remain in force for the period of the war, or for a limited time thereafter. What the Trustees want now is power to increase their rates permanently. While rates on goods, imported or exported, have been increased on several occasions within recent years, no permanent additions have been made to the dues on shipping for a long period. Under the Provisional Order now before Parliament the Trustees seek to revise practically all rates and dues chargeable at the harbour, in order to meet the increased cost of working the undertaking. At the same time, they contemplate the carrying out—after the war—of some scheme of harbour improvement which is certain to involve a very large capital expenditure.

Engineering Works Extension.—Reference has frequently been made in this column to the great expansion which has taken place in the output capacity of many of the Clyde shipyards and engineering works. In few cases, however, has it been possible to give details of the extensions and improvements made. A good example of what has been done is found in the improvements carried out on the works of the firm of McKie & Baxter, engineers, Govan. The works were started in a small way, 21 years ago. The area of ground covered was, originally, 3,000 sq. yds., but it has sub-

sequently been increased to 15,000 sq. yds. Prior to the war the output of the firm consisted of machinery, representing about 10,000 i.h.p. per annum, but now the figure is about 40,000 i.h.p. per annum. Further extensions are in progress at the present time the object of which is to allow the firm to build larger marine engines than they have yet done, and also to enable them to undertake the construction of geared turbines. Since the war began they have constructed several sets of large engines for standard ships, and six sets of this type of machinery are at present under construction, as well as a large amount of special work for the Admiralty.

Storage of Grain at Glasgow.—Although the Clyde Trustees have almost suspended capital expenditure on the harbour and docks for the period of the war, there are one or two directions in which they have recently effected considerable improvement in the equipment of the port. One of these is the provision of additional facilities for the rapid handling of grain cargoes and for the storage of grain brought in from overseas. There were recently installed in the sheds at Meadowside grain wharf several sets of band conveyors, made in the Trust's own workshops for the discharge of grain direct into the shed. Conveyors and pilers for piling grain in the sheds and for loading it into wagons on the roadway have also been provided. The work of the Clyde Trustees in this direction was referred to by Sir Thomas Mason at a meeting of the Trust last week. The building of the granary at Meadowside, he said, had been a great advantage to the shipping community and to the citizens of Glasgow generally at this time of strain and stress. The Trustees had, further, been able to provide, at the instance of the Shipping Controller, more accommodation for grain than even the capacity of the granary was capable of. He thought this was a matter of considerable satisfaction to the Trustees.

SCOTTISH EAST COAST DISTRICT.

(FROM OUR OWN CORRESPONDENT.)

Ferry Rates at Dundee.—At a meeting of Dundee Harbour Board last week the proposal to increase the Tay ferry rates was confirmed. In future the fare for a single passage will be 4d. and 6d. return. The new rates come into operation on February 4.

Dock Facilities at Leith.—The Dock Commissioners of Leith have at present under consideration a scheme the object of which is to bring Leith up to the greatest possible state of efficiency with respect to the provision of facilities for the rapid loading and discharge of vessels coming to the port. The matter was referred to in a circular received recently from the Port and Transit Executive Committee, Ministry of Shipping, and a report on the subject has been asked for by the Committee with a view to making arrangements for the development of trade after the war. A good deal has already been done by the Commissioners since the war began in providing up-to-date facilities for the rapid handling of shipping.

Concrete Barge Building at Dundee.—An application by a firm for a site for the construction of reinforced concrete barges came before a meeting of the Dundee Town Council last week, and while nothing definite was decided, the Council agreed to appoint a committee to inquire into the question of whether there was ground available for the purpose. A site of about two acres in extent is required for the proposed works, and it has been suggested that recreation ground near the Tay Bridge might be used for the purpose, provided the work of constructing concrete barges is to be carried on for the period of the war only. If, however, the industry is to be a permanent one, it is contended that a more suitable site should be found, and that the public should not be deprived of the use of their recreation ground. The Town Council are, of course, unwilling that the company should have to go elsewhere for a site, and they are resolved to do all in their power to encourage the new industry in their district. As an alternative site for a concrete shipyard, it is proposed to reclaim a stretch of the river front extending from Broughty Ferry to Stannergate, but the work of reclamation might take too long, especially as it is desirable that a start should be made as early as possible with the actual construction of the barges. Application was made some time ago to the Dundee Harbour Board for a site, but that body has no suitable ground available for the purpose of a barge-building shipyard.

NORTH-EAST COAST DISTRICT.

(FROM OUR OWN CORRESPONDENT.)

Work at Tyne Shipyards.—After nearly two weeks had been given up to holiday-making, the work at Tyne shipyards in the third week was considerably interrupted by a snow storm and severe frost. Work in the open in these circumstances was almost out of the question. Some idea of the arctic conditions that prevailed in the Mid-Tyne district, where the shipyards are closely clustered together, may be gathered from the fact that 21 degrees of frost were registered at Willington Quay.

Education of Seamen's Orphans.—At a meeting in Durham on Thursday, the Dowager Marchioness of Londonderry, who presided, announced that £11,000 was collected in Northumberland for Sailors' Day and £9,000 in Durham. The money is to be applied for education purposes, and the Minister of Education (Mr. Fisher) wrote expressing satisfaction that the counties named had collected £20,000 for the education of orphans of men of the Royal Navy and Mercantile Marine who had lost their lives during the war.

Work of the Naval Hostel.—In the past three months there has been further evidence of the excellent work being done at the Naval Hostel in Newcastle. At a meeting on Thursday, January 11, over which the Lord Mayor (Sir George Lunn) presided, it was stated that from October 7, 1917, to January 6, 1918, 279 officers and 16,087 men had slept at the hostel, the total number of men who had slept there since the building was opened in March, 1916, being 67,414. There is now a scheme under consideration for providing further sleeping accommodation at the hostel.

Wireless at Rutherford College.—The enterprise in wireless telegraphy at Rutherford College, Newcastle, the apparatus for which was installed at the expense of the local shipowners, has made capital progress. It was stated at the last meeting of the North of England Steamship Owners' Association that there are now 21 students who have passed the necessary examinations and are available for employment. A new and interesting calling is thus opened out for Tyne-side boys, and it is encouraging to the shipowners to find that lads are availing themselves of the opportunities for training in such goodly numbers.

National War Aims.—Mr. J. M. Robertson, M.P. for the Tyne-side Division, paid a visit to his constituency in the last few days and addressed meetings of workmen at the Wallsend shipyard of Swan, Hunter & Wigham Richardson, Ltd., and at the adjacent works of the North-Eastern Marine Engineering Co., on the national war aims. It was announced at the former meeting by Mr. Bone, secretary of the Wallsend Shipyard War Savings Association, that Swan, Hunter and Wigham Richardson had placed at the disposal of the Committee for clerks, draughtsmen, timekeepers, workmen, and workwomen a free gift of 1,000 war savings certificates in order to encourage investment in national funds.

Order of the British Empire.—No less than 27 members of the North-East Coast Institution of Engineers and Shipbuilders received honours in the latest list of recipients in connection with the Order of the British Empire, and this was made the subject of congratulatory reference at a meeting of the Institution in Newcastle on Friday last. It may be mentioned that Mr. Waldie Cairns' paper on "Some Insufficiently Considered Details of Ship Construction and Equipment" has made such an impression on the Council of the Institution that it has been decided to appoint a committee to consider the question of how far ship fittings can be standardised, and to draw up a specification which would prescribe a minimum scantling for all the various fittings which could be treated. Such a specification, it is believed, would render signal service to the shipbuilding industry.

The Iron and Steel Industry.—Matters of interest to the iron and steel industry on the North-East Coast were alluded to by the Chairman, Mr. A. Callaghan, at the annual meeting of the Cleveland and Durham Blastfurnacemen's and Cokemen's Association at Middlesbrough. He asserted that numerous problems had been rendered more acute by the failure of the Government Departments to recognise that iron and steel were basic trades upon which other industries depended equally as much as upon the coal trades. The wages agreement made for the coal and engineering trades could not be applied to the iron and steel trades without friction, and he disapproved of the action of the Government in granting subsidies in the latter industry instead of increasing the maximum price of

pig iron. Both employers and men were agreed on this point as the subsidy abrogated the whole principle of the sliding scale which regulated wages.

Shipment of Sulphate of Copper.—Newcastle Chamber of Commerce joined with the Liverpool Chamber of Commerce in sending a deputation to the Board of Trade relative to the shipment of sulphate of copper to France. It was stated that the English Government has allowed the French Government to make a monopoly in the shipment of this product, the effect of which would be to eliminate the merchant. There are now numerous indications that the merchant or middleman is in danger of being driven out of business by the newer tendencies for the user to be in direct touch with the producer. At the Newcastle Chamber of Commerce meeting, Captain J. E. Tully cited shipbroking as one business that had been seriously affected in this way, and remarked that they desired the trade of the country to be continued on the old lines, and urged that everything tending to that end should be of interest to Chambers of Commerce.

Tax upon Inventors.—Mr. H. W. Clothier has induced the General Purposes Committee of the Newcastle Chamber of Commerce to include in their resolutions to be forwarded for the annual meeting of the Associated Chambers of Commerce a proposal urging the abolition of the yearly tax upon inventors under the patent laws. At a meeting of the Council when the subject was ventilated he pointed out that the tenure of a patent in this country was 14 years, and in that period the patentee paid in yearly fees to the Government about £100. He contended that inventors should not be burdened in this way and that research work should be encouraged in every possible way. For these and other reasons Mr. Clothier considered the abolition of the patent tax was a suitable subject for the Associated Chambers of the country to take up, especially at this time when the revision of the patent laws was under the consideration of the Government.

MERSEY DISTRICT.

(FROM OUR OWN CORRESPONDENT.)

German Territory in Africa.—The Council of the Liverpool Chamber of Commerce has just endorsed the views of the African Section of the Chamber that territories formerly held by Germany in Africa should not be restored to her rule after the war for a number of reasons set forth in a memorandum prepared by that Section.

The Atlantic Combine.—The Norwegian Consul in Liverpool characterises the suggestion of the Norwegian-America Line throwing in its lot with the Germanic North Atlantic combine as rubbish. On the contrary, he says, his instructions have always been to ally himself when representing the Norwegian-America Line with the British, and particularly the Liverpool lines.

Special Look-out Men.—Mr. Thomas E. Sargent, Chief Superintendent of the Mercantile Marine office here, interprets the Admiralty regulations regarding the provision of four look-out men on every vessel of 500 tons gross and upwards, to mean that these special look-outs are to keep four-hour watches in the same manner as other members of the crew—half the watch in spells as arranged by the master to be kept on special look-out; during the other half of their watch they are to be available on deck for stand-by duties other than the ordinary work of the ship.

Settlement of Claims for Losses.—The serious delays that Liverpool shipping and forwarding agents have for a long time experienced in obtaining settlement of claims for total cargo losses, as apart from steamer losses, has occasioned such resentment that united action has been taken by an appeal to the Liverpool Chamber of Commerce in the hope that the influence of that body will be brought to bear in getting settlements accelerated. It is no unusual thing, it seems, for claims to be completed and in possession of the War Risks' Office for five or six weeks before a settlement is obtained, and these delays in many instances have not only been unwarranted, and moreover been injurious to trade, but have been a distinct hardship to merchants and exporters. Recognising this, the Liverpool Chamber had decided to take the matter up with the War Risks Insurance Committee.

Refrigeration of Ships' Provisions.—Mr. J. B. Wilkie, M.I.Mech.E., M.I.N.A., superintendent engineer of the Mersey Engine Works (Elder, Dempster & Co.), read a paper before the Liverpool Engineering Society, on Thursday, on "Refrigerator Installations for Carriage of Ships' Provisions." Mr. Wilkie

observed that in the future, few vessels will be built without refrigerator installations. As showing the reliability of the present day machines, he said he had particulars of 40 steamers fitted in one fleet, the machines being fitted with a single compressor, and for a period extending over the last 12 years, in no single instance had a machine broken down and spoilt the provisions in the chamber. Efficient machines were, however, of little value if the chambers were faulty or leaking. He described the facilities for transferring meat from the shore store to the steamer as inadequate and insufficient, and said insulated wagons should be used for this purpose.

SOUTH WALES DISTRICT.

(FROM OUR OWN CORRESPONDENT.)

Trade of Swansea Harbour.—The official returns of the Swansea Harbour Trust show that imports last month totalled 37,023 tons, compared with 39,731 tons in the corresponding month in 1916. Exports amounted to 302,653 tons, as against 254,102 tons in the same period the previous year. The completed returns for the twelve months ending December, 1916, show that imports amounted to 499,017 tons, as against 671,324 tons in 1916. Exports in the same period showed a total of 3,597,250 tons, compared with 4,484,769 tons in the previous year.

Swansea Harbour Trust and Government Control.—Efforts have been made for some time past by the Harbour Trust Authorities to get the port of Swansea in line with the other large ports of the Bristol Channel, but up to the present the Board of Trade have refused to recognise it as a controlled port, but further efforts are being made to secure the assent of the authorities to this appeal. At the next meeting of the Trust the resignation of Sir Griffith Thomas as chairman will be received, when a resolution will be proposed recognising his valuable services during the past 24 years. Mr. Roger Beck, chairman of the finance committee, is to fill the office of chairman of the Trust till the annual meeting in March, when he will probably be elected in the place of Sir Griffith Thomas. Mr. Beck, it is stated, has recently rendered great service in guaranteeing interest payments in connection with the financial obligations of the Trust.

Utilisation of Space for Ships' Stores.—A large meeting of shipowners was held at the Exchange, Cardiff, on Friday, in connection with the request of the Food Controller to shipowners to utilise all the space available on their vessels for the bringing of foodstuffs to this country. The attendance included Mr. T. G. Jones (the Director of Ships' Stores), Mr. Frank Houlder and Mr. W. E. de Gruchy. Mr. Jones said that the Ships' Stores Restriction Order, which came into operation in December, had been more than justified. Enormous quantities of essential foodstuffs had been prevented from leaving the country as surplus stores. With regard to the proposed pooling scheme for the provisioning of ships, he said that the scheme aimed at shipowners encouraging masters and officers to bring into the country as much foodstuffs as possible. The shipowners would have the first call on the pool, which would be managed by themselves, and not by the authorities. An endeavour would be made to get everybody into the scheme, and many shipping companies had already instructed their agents abroad to get their boats filled with all the foodstuffs that might be available. The pooling scheme was adopted, and a committee, consisting of Sir Edward Nicholl, Mr. S. W. Hansen, and Mr. Emlyn Jones, was appointed to arrange details of the scheme.

Cardiff Shipping Deal.—A circular has been issued to the shareholders of the Scarisbrick Steamship Co., Ltd., by Elvidge & Morgan, the directors and managers, informing them that they had recently received an offer from C. L. Clay & Co., Ltd., coal exporters and colliery agents, Cardiff, to acquire a very large proportion of their interest in the Scarisbrick Steamship Co., and they had now come to terms with them. It is therefore probable that the management policy of this Company will undergo some modification. Before deciding to accept the offer made them the managers determined to secure to their shareholders an opportunity to realise their holdings at a good premium, and have arranged that Clay & Co. should offer to purchase their shares. They are therefore authorised to state that they will pay every shareholder who accepts, £2 5s. for each £1 share. This offer is subject to acceptance on or before the 23rd inst. The circular states that the control of the Company's affairs has hitherto been entirely in the hands of the managers, but it will henceforth be exercised chiefly by Mr.

Clay. They will, however, continue in association with him and others as directors of the Company.

The above offer is exclusive of the final dividend of 7½ per cent. now due to shareholders, and the transfer of the shares will be free of all charges. The Scarisbrick Co. has a capital of £100,000 in £1 shares, and in March last the amalgamation with the Rosella Steamship Company, Ltd., was completed. The company now owns two steamers, and for the past year the distribution was 20 per cent., less tax. Mr. C. L. Clay, the principal of C. L. Clay & Co., Ltd., is a director of the Glenavon Garw Collieries, Ltd., and very largely interested in the coal export trade to France.

Conference of Shipowners.—The Cardiff and Bristol Channel Shipowners' Association have had a conference with Mr. H. McCleminson, general manager of the Chamber of Shipping of the United Kingdom. Mr. McCleminson was received by the chairman (Mr. W. E. Jones) and other prominent members of the Association. The conference was private, but it is stated that Mr. McCleminson gave an exhaustive survey of the work of the Chamber during the past year, and dealt with the efforts that had been made to secure an increase in the Blue Book rates of freight for requisitioned vessels. He also dealt with the question of club calls in respect to war risks on vessels. On Thursday Mr. McCleminson addressed a meeting of the Swansea Chamber of Commerce. Mr. W. Turpin, chairman of the shipping section, presided. Mr. McCleminson said that if this country could not so manage that every section of industry worked alongside with each other then we should lose in the race for commercial supremacy. To-day our commercial position was threatened as at no other time. Dealing with the use of wireless on board ships, Mr. McCleminson said that if its use in the past had been of value to humanity, then they should use wireless. The British Government, he said, could never hope to run ships cheaper than private owners. Tramp shipowning was not a matter which could be taken over by the Government; several foreign governments had decided against State ship ownership. It was in the interests of the Government that they should return the ships to their owners at the earliest available opportunity. It was urgent that the Government policy should be declared, so that any fears regarding the future could be allayed. Mr. P. W. Phillips, general manager of the Harbour Trust, in supporting a vote of thanks to Mr. McCleminson, spoke of Swansea's efforts for the development of the port, and hoped Mr. McCleminson would use his influence with the Government when standardised ships were allocated to see that Swansea got its share.

THE FREIGHT MARKETS.

(FROM OUR OWN CORRESPONDENTS.)

London.—The amount of chartering business passing on the Baltic Exchange continues to be very small, but from all quarters there is a brisk demand for available tonnage. Government rates from the River Plate to the United Kingdom are unchanged at 145s. from the up-river ports, and 5s. less for down-river loading, but neutrals command 200s. to the United Kingdom, and 205s. to France. On the North American Atlantic seaboard a good deal of business could be done on net form of charter at 230s. to the United Kingdom, 260s. to France, and 360s. to Italy, or an additional 30s. for Gulf loading. For heavy grain, 50s. would be paid from the Northern Range to the United Kingdom, 56s. 3d. or 57s. 6d. to France, and 75s. to Italy. Virginia coal cargoes to the Plate at round about 117s. 6d. could be had, and nitrate business is worth 180s. to the United Kingdom. The small amount of neutral tonnage to be had causes rates from the East to be well maintained. Karachi still indicates 250s. on scale basis to this country, and Bombay, 275s. on deadweight to the same destination, or 400s. to the Mediterranean. Kernel cargoes are worth 550s. from the Madras Coast to Marseilles, and for rice from Burmah or Saigon to this country or France, 500s. is indicated. Salt could be worked at 47s. 6d. from Torrevecchia to Penang, and to Calcutta, 52s. 6d. is named, while from Aden to Calcutta, a 4,200-ton steamer has been fixed at 28½ Rs. In the Mediterranean, rates are unchanged at 45s. Huelva to the Mersey, or 60s. to the East Coast United Kingdom for pyrites; 50s. Bougie, and 65s. Tunis, to the Clyde; 75s. Sfax to the Bristol Channel, and 50 fr. Bilbao to Boulogne. In the Bay trade, fixtures have been done at 17s. and 20s. Bordeaux to Bristol Channel, and 27s. 6d. Bordeaux to the Mersey.

Glasgow.—There has been little change in the condition of affairs on the Glasgow market throughout the week. Coal tonnage has been difficult to secure and business has been quiet. Any boats available were quickly allocated at firm rates. Homeward markets were also much short of boats and the tone remained firm. The following fixtures were reported:—Bordeaux, 700, Bristol Channel, 17s., prompt; time charter, States and West Indies, 2,800 to 3,300, 35s., one round trip, delivery and re-delivery North of Hatteras; time charter, 4,800 to 5,200, 40s., one round trip, delivery New York, re-delivery North of Hatteras; sailing ship, Virginia to Buenos Ayres, 2,300, \$18.50, net form, January-February.

Newcastle-on-Tyne.—The ever-present chronic shortage of tonnage nowadays has been aggravated during the past week by delays caused by wintry weather, to stemmed vessels and, as a whole, the market has been in a very unsatisfactory condition. At the time of writing, a good many of the collieries in Northumberland and Durham are adequately supplied with shipping, but others are having to lie idle or to work short time because of the dearth of steamers. Orders for all directions with which military conditions permit us to trade are numerous and high rates are on offer for cargo space, but, for the most part, without avail, neutral owners continuing to hold off. Business done in the local freight market during the week has been mainly confined to fixtures from Swedish destinations. For Tyne loading, Gothenburg has been fixed for at 182½ kr. for a 20,000-ton vessel, with the option of Stockholm discharge at 197½ kr. From Blyth or Wear, Stockholm has been arranged for, for a 1,700-tonner, at 195 kr. For Wear loading, Gothenburg has been done at 182½ kr. for a vessel of 1,850 tons. These rates indicate a slightly greater firmness for Gothenburg and an advance of 2½ kr. for Stockholm. London has been twice arranged for at 21s., and 21s. 6d. is now freely offered. For the Spanish Atlantic, the quotation remains at 180s. to Bilbao or Santander. For Portuguese ports, 115s. to Lisbon and 125s. to Oporto are still on offer. The coaling stations are steady at 100s. to Gibraltar and 200s. to Port Said. The Spanish Mediterranean is unchanged at 300s. to Barcelona. It should be observed that it is now quite a considerable time since any fixtures were made for the seven last-named ports.

Liverpool.—A keen demand continues in outward freights, especially to neutral ports, but there is a poor response notwithstanding the very high rates offering. A hand neutral coal boat of 800 tons d.w. has got 410s. per ton Liverpool to Barcelona, January, and this indicates that neutrals will pay almost anything to obtain fuel supplies. In the controlled trades, maximum rates are operating, but with tonnage scarce, business done is very limited. A good demand continues for time charters, and a States-West Indies round trip made 35s. Two vessels chartered in the general trades for twelve months made 43s. 6d. (5,000 tons d.w.) and 45s. (2,200 tons d.w.) respectively. Homeward freights are generally quiet, but firm. Easterns still call for tonnage, and Madras offers 500s. for kermels to Marseilles, and Bombay 440s. d.w. to Mediterranean. Calcutta has obtained a boat to River Plate, 7,000 tons, at 350s., February. Mediterranean homeward freights are active, and ore ports absorb all tonnage offering. North America has an active demand for grain on basis of 50s. to United Kingdom, and seeks tonnage on net form from the Range Ports at 230s. United Kingdom, 360s. Italy, and 18½ to River Plate. River Plate, homewards, quotes 220s. to United Kingdom from lower ports.

Cardiff and Swansea.—Very quiet conditions have prevailed during the period under review. The inquiry continues on a brisk scale, but actual business has been of small dimensions, owing to the poor tonnage position. There has been no difficulty in maintaining rates at their maximum for all directions. An active demand exists for tonnage for Spanish ports, for which direction exceedingly high figures were quoted. The only transactions disclosed were for France:—Nantes, twice at 30s. (Allied); Cherbourg, 47s. 3d. (neutral); and Caen, 48s. (neutral). On the Swansea market no change has taken place in the general conditions. Firmness has characterised quotations for all directions. The demand for limitation destinations was fully maintained, and rates were easily maintained up to the official maximum levels. Transactions reported were Havre at 45s. 9d. and 47s. 3d. (neutral), and Rouen 48s. 9d. (neutral).

Hull.—The market has a firm tone all round and though there is a good inquiry for carrying power the general scarcity of it affects

business. The North French demand is good, but this trade also is affected by the paucity of tonnage, though a moderate traffic has certainly passed in both sail and steam. The West Italian market has a firm tone all round, but chartering there is quiet. The Swedish trade shows increased activity when cargoes can be arranged, subject to the Governmental scheme by which cargoes of national importance must be brought to England from Sweden first and the coal taken as a return cargo. The export of Derbyshire and Nottinghamshire steam hards is now forbidden up to next March, except for Admiralty purposes.

COMPANY REPORTS AND DIVIDENDS.

St. Just Steamship Company, Ltd.—The managers, W. R. Smith & Sons, Cardiff, have paid an interim dividend of 1s. per share, free of income tax.

Cairn Line of Steamers, Ltd.—Dividend of 2½ per cent. and bonus of 6d. per share (making 1s. per share), free of income tax, on ordinary shares (interim). Last year the distribution was the same.

Furness, Withy & Co., Ltd.—Warrants for dividend on the ordinary shares of 10 per cent. per annum for the quarter ending January 31, being 6d. per share, free of tax, will be posted on that date to all shareholders registered on January 16.

Chadburn's Ship Telegraph Company, Ltd.—The accounts for the year ended March last show that profits amounted to £42,177, and £2,525 was brought forward. Excess profits duty, munitions levy, income tax, &c., absorb £24,878, and £4,535 is allocated for depreciation. The directors have paid dividends on the ordinary shares amounting to 9 per cent., and £3,586 is carried forward.

Scarisbrick Steamship Company, Ltd.—The report states that the accounts, after providing for excess profits duty, &c., show a balance to profit and loss of £16,495, which added to £446 brought forward makes £16,942. A final dividend of 7½ per cent., less income tax, is recommended, carrying forward £1,942. Working expenses are continually increasing, while the cost of stores, provisions, insurance and repairs is enormous.

Dresdner Maschinenfabrik u. Schiffswerft, Ubigau A.G.—A dividend of 7 per cent. has been declared for 1916-17, compared with 6 per cent. last year. The directors report that, as in the previous year, all departments were fully occupied, and prospects are good for the current year. The accounts show a surplus (including balance brought forward) of £20,200 (£18,800 last year). Depreciation absorbed £9,620 (compared with £9,450); statutory reserve, £425 (£285); bonuses, £1,220 (£1,150); and dividends, £6,850 (£5,880). The balance of £2,050 (£2,050) is brought to current account.

Osaka Shosen Kabushiki Kaisha.—The directors in their report for the year ending June 30, 1917, state that the business results were remarkably good, owing to the qualities of cargo carried and to the increase in freights. The profit and loss account shows receipts to have been 30,793,696·39 yen; and expenditure, 20,101,389·83 yen; giving a net profit of 10,692,306·56 yen. To reserve fund 555,000 yen is allocated and 268,000 yen is absorbed by directors' and auditors' fees. The balance of 9,889,306·56 yen, together with 1,203,645·01 yen brought forward, gives a total of 11,092,951·57 yen, out of which the business extension fund absorbs 1,000,000 yen and the dividend equalisation fund 1,000,000 yen; a dividend of 10 per cent. absorbs 1,170,262·50 yen and an extra dividend of 30 per cent. absorbs 3,510,787·50 yen; an extra bonus to employees afloat and ashore takes 400,000 yen, and 2,500,000 yen is written off for extra depreciation of fleet; leaving 1,511,901·11 yen to carry forward.

Nippon Yusen Kaisha.—The report of the directors for the half-year ended September 30, 1917, states that the surplus of earnings after deducting current expenditure amount to 31,470,201·85 yen, out of which have been deducted: 1,309,744·50 yen for depreciation of the fleet and property; 864,970·71 yen for insurance fund; and 313,844·59 yen for ships' structural repair fund; leaving a balance of 29,514,075·83 yen, including 532,433·78 yen brought forward. The directors propose that this surplus be appropriated as follows: 1,449,082·10 yen to reserve fund; 10,000,000·00 yen to special reserve for war risk and depreciation

of vessels to be built and purchased: 1,500,000-00 yen to extra depreciation of book value of fleet; 5,500,000-00 yen to special reserve; 1,530,000-00 yen to dividend equalization fund; and 350,000-00 yen to fund for training, protection and encouragement of seamen. From the remaining balance of 9,184,993-73 yen the directors propose that 310,000 yen be allowed as the directors' and auditors' fees and 1,000,000 yen as special grant to the staff ashore and afloat as well as the ordinary seamen for their services in connection with the war, and recommend a dividend of 8 per cent. per annum, besides 2 per cent. per annum as special dividend and 40 per cent. per annum as extra dividend, the total of these dividends to absorb 7,190,480 yen, leaving a balance of 684,513-73 yen to be carried forward. The directors also propose that the share capital of the company be increased from 44,000,000 yen to 100,000,000 yen, upon the present share capital being fully paid up on February 15, 1918, the number of new shares to be issued being 1,120,000 of 50 yen each.

American Ship Building Company.—The eighteenth annual report for the fiscal year ended June 30, 1917, states that the year has been one of great activity in new construction and repair work. During the year, 31 ships, with a total capacity of about 161,000 gross tons, have been completed and delivered to owners. There are now 43 ships, with a total carrying capacity of about 160,000 gross tons, under contract. Appropriations for additional buildings, equipment and other improvements amounting to \$1,063,000-00 have been authorised. There has been expended \$15,000-00 for lands adjoining the Lorain plant, and \$555,778-29 for buildings, equipment and other improvements. These additions have materially improved the efficiency of the several plants. The stockholdings in the Western Dry Dock & Shipbuilding Company, Ltd., of Port Arthur, Ontario, have been sold at a net advance of \$242,000-00 over book value; an account amounting to \$365,168-49 due to this company was paid in full, releasing it from all commitments for the benefit of the Western Dry Dock & Shipbuilding Company, Ltd. The stock and bonds of the Great Lakes & St. Lawrence Transportation Company owned by the company were sold at a net advance of \$262,530-00 over book value. The sales of other securities realised a total of \$22,770-05 over book values. There are no incumbrances on any of the properties of the company, and no known contingent liabilities. The purchase money mortgage bonds of the Buffalo Dry Dock Company were retired at the close of the fiscal year. Inventories were taken on a basis of actual net cost at the time of purchase not to exceed the prevailing market prices, and the valuations of standard ship steel were fixed at prices recently paid by the United States Navy Department, namely, \$2-90 per cwt. for ship plate and \$2-50 per cwt. for shapes, angles and bars, f.o.b. Pittsburgh. While the net earnings for the year are satisfactory, they do not represent the maximum earning capacity of the company. A considerable part of the earnings of the current year came through the early and advantageous purchase of materials. The scarcity of labour and materials, unusually bad weather conditions, embargoes, rising costs, and other contingencies have prevented the management from obtaining maximum results. The consolidated general profit and loss account shows a net profit of \$3,548,040-21, after deducting all normal taxes, charging off all maintenance charges during the year and providing for depreciation in the amount of \$603,039-56, compared with a depreciation charge of \$325,472-48 for the previous year. There has been set apart as a separate reserve to cover additional excess profits taxes, estimated for the six months' period from January 1, 1917, to June 30, 1917, making a net addition to be carried forward to surplus account of \$3,148,040-21. The consolidated surplus account shows a net addition for the year of \$1,786,540-21, after providing for dividends of 10½ per cent. on the preferred stock and 7 per cent. on the common stock, or a total during this period of \$1,361,500-00. The total combined surplus of the company and its subsidiary companies at June 30, 1917, was \$5,147,563-98. The earnings during the year amounted to 7 per cent. on the preferred stock and 34½ per cent. on the common stock after all deductions for depreciation, ordinary taxes and special reserve of \$400,000-00 for excess war taxes.

ONTARIO SHIPBUILDING.—The Imperial Trade correspondent at Toronto reports that a Canadian company which has recently acquired a plant at Bridgeburg has been awarded a contract for the construction of four steel cargo vessels, at a cost of \$3,000,000 (about £625,000 at present rate of exchange).

COMPANY REGISTRATIONS.

St. Dunstan's Syndicate, Ltd.—Capital, £5,000, in £1 shares. Objects: Ironmasters, steel makers and converters, colliery proprietors, ship and barge owners, engineers, &c. Signatories:—H. N. Knight, 19, St. Dunstan's Hill, E.C. 3, engineer and contractor. F. L. Baldwin, Broom Hill, Great Barr, Birmingham, iron founder.

The first directors are:—H. N. Knight, J.P., and F. L. Baldwin. Registered office, 19, St. Dunstan's Hill, E.C. 3. Private company.

Sapphire Bay Shipping Company, Ltd.—Capital, £30,000, in £1 shares. Objects: Shipowners, tugowners, ship and insurance brokers, shipping agents, loading brokers, carriers, forwarding agents, freight contractors, &c. Signatories:—

S. W. Oakley, 52, Gracechurch Street, E.C. 3, shipowner.

A. D'Ambrunil, 3, St. Helens Place, E.C., insurance broker and underwriter at Lloyd's.

First directors: A. Le Jeune and G. Trail, S. W. Oakley and A. D'Ambrunil (all permanent). A. Le Jeune is Belgian, and the others are British. Solicitors: Bruce, Miller & Co., 28A, Basinghall Street, E.C. 2. Private company.

Red Rose Steam Trawlers, Ltd.—Capital, £30,000, in £1 shares. Objects: To carry on at Fleetwood and elsewhere the business of steam and other fishing vessel owners, sellers, storers and preparers for market of fish, ice manufacturers and merchants, refrigerating room owners, &c. Signatories:—

C. W. Barratt, Parkside, Middleton Road, Oldham, accountant.

G. Mills, 149, Gainsborough Avenue, Oldham, stock and share broker.

The first directors are:—A. Andrew, N. Ashworth, E. Taylor, C. W. Barratt and G. Mills. Qualification, £500. Registered office, Orient Buildings, Station Road, Fleetwood. Private company.

British Steam Navigation Company, Ltd.—Capital, £100,000, in 5,000 first preference shares of £5 each, 600 second preference shares of £5 each, and 28,800 ordinary shares of £2 10s. each. Objects, to purchase, work, sell and deal in and with steam and other ships, boats and vessels of all kinds, &c. Signatories:—

Sir J. A. Arnott, 12, Merriion Square, Dublin, baronet.

W. Langlands, 50, Prince Street, Bristol, gentleman.

W. Beloe, 21, Langridge Road, Clifton, Bristol, sugar broker.

E. C. D. Lovell, Massina, Scotts Lane, Shortlands, gentleman.

W. G. Clarke, 22, Clarendon Road, Redlands, Bristol, company secretary.

Wm. B. Cole, Rock Villa, Nore Road, Portishead, shipping manager.

S. Piper, 81, Clifton Road, Weston-super-Mare, accountant.

Minimum cash subscription: Seven shares. The first directors are:—Sir J. A. Arnott, W. Langlands, W. Beloe and E. C. D. Lovell. Registered office: 50, Prince Street, Bristol.

F. H. Porter & Sons, Ltd.—Capital, £50,000, in £1 shares. Objects: To take over the business of a ship scalar and cementer, carried on by F. H. Porter, as "Porter and Sons," at 5-15, Shaws' Alley, 41, Regent Road, and 46-52, Bridgewater Street, all in Liverpool, also to carry on the business of ship painters, boiler and pipe coverers, marine and labour contractors, civil and marine engineers, ships' store merchants, oil, colour and varnish merchants, &c. Signatories:—

F. H. Porter, 5, Shaws' Alley, Liverpool, ship cementer.

F. W. Porter, 5, Shaws' Alley, Liverpool, marine contractor.

C. Porter, 377, Park Road, Liverpool, company director.

The first directors are:—F. H. Porter (permanent), F. W. Porter and C. Porter. Registered office: 5, Shaws' Alley, Liverpool. Private company.

William Denny and Bros., Ltd.—Capital, £500,000, in 250,000 preference shares and 250,000 ordinary shares of £1 each. Objects, to take over the business of W. Denny & Bros., shipbuilders, and Denny & Co., engineers, both of Dumbarton. Signatories:—

J. Denny, Dumbarton, engineer.

J. McC. Denny, Dumbarton, engineer.

A. Denny, Dumbarton, shipbuilder.

L. Denny, Dumbarton, shipbuilder.

D. Jackson, Dumbarton, shipbuilder.

W. McK. Wisnom, Dumbarton, engineer.

W. Brock, Dumbarton, engineer.

M. C. Denny, Dumbarton, shipbuilder.

G. K. Ward, Dumbarton, shipbuilder.

J. McC. Denny, Junr., Dumbarton, engineer.

First directors: J. McC. Denny, Sir A. Denny, D. Denny, D. Jackson and W. McK. Wisnom, W. Brock, G. K. Ward and J. McC. Denny, Junr. Registered office: Leven Shipyard, Dumbarton. Private company.

QUESTIONS IN PARLIAMENT.

Standard Ships.

Mr. Pringle on January 14 asked the Parliamentary Secretary to the Shipping Controller to state the number of standard ships completed up to December 31 and how many had been sunk.

Sir L. C. Money: Thirteen standard ships were completed and delivered up to December 31, 1917. The number sunk remains at one.

Shipping Losses.

Mr. Pringle on January 14 asked the Parliamentary Secretary to the Shipping Controller whether the proportion of ships completed to ships sunk by the enemy which prevailed in November had been maintained in the month of December.

Sir L. C. Money: The reply is in the negative. The results of December were not so favourable as in November.

Shipbuilding Facilities in Dublin.

Mr. Field on January 14 asked the Secretary to the Admiralty whether he was aware that a convenient site for a Government shipbuilding yard could be obtained from the Dublin Port and Docks Board; and whether the Admiralty would consider the advisability of establishing the industry in Ireland's capital.

Dr. Macnamara: In November last I stated that there was no intention of establishing a national shipyard in Ireland, but as I have stated before, every effort is being made and will be made to take full advantage of the resources of the various shipbuilding yards in Ireland. With regard to the Dublin Dockyard Company itself, the berths of this company are being rearranged, so that instead of having three berths they will possess four berths within six months. As regards the site referred to by my hon. friend it has been suggested to the Dublin Dockyard Company that this site should be utilised as an extension of their existing yard. We are in communication with the company on the matter.

Loss of the Second Norwegian Convoy.

Commander Bellairs on January 14 asked the First Lord of the Admiralty whether he was now in a position to make his promised statement on the results of the inquiry into the loss of the second Norwegian convoy; and whether he would make a statement as to the outcome of any inquiry into the attack on a convoy off the Tyne on the same day.

Sir Eric Geddes: A Court of Enquiry appointed by the Commander-in-Chief, Grand Fleet, has been held into the circumstances connected with the attack on the Scandinavian convoy which took place on Wednesday, December 12, 1917, when H.M.S. *Partridge* was sunk and H.M.S. *Pelieu* damaged. The Board of Admiralty, after full consideration, confirm the finding of the Court, in its opinion that the escorting vessels did their best to protect the convoy and were fought in a proper and seamanlike manner, and that the other forces which were at sea for the purpose of giving protection to the convoys, which were crossing the North Sea at that time, took all possible steps to come to the assistance as soon as the attack was reported to them and to prevent the escape of the enemy. The Court of Enquiry makes a number of recommendations on the Convoy System. These, I need not assure the House, have received and are receiving the closest consideration. From the commencement of the Convoy System, its great difficulties have been recognised and adjustments and improvements are continually being made, and its general great success is attributable thereto. It is due to Sir David Beatty that I should say that the Board of Admiralty are further of opinion that the circumstances which prevented the covering forces from being on the spot at the time of the attack were such as could not be prevented, and they are of opinion that the Commander-in-Chief's dispositions were the best that could have been made with the forces available at the time. As regards the second part of the question, the enemy's attack off the North-East Coast of England was upon two neutral vessels which had become separated in the dark during the night of December 11-12 from a south bound convoy. One of these two vessels was attacked in the very early hours of the morning of December 12 and sunk. The survivors, except two engineers who went down with the ship, were picked up by patrol forces which were shortly on the scene. Soon afterwards on the same morning the other neutral vessel which had been separated from the convoy was also attacked and the crew abandoned the ship, which afterwards broke in two, the two halves being later towed into port. The vessels escorting the convoy from which the ships had fallen astern were unaware of the attack owing to the distance separating them.

NEWS PARAGRAPHS.

Presentation for Saving Lives.—The British Consul at Barcelona recently made a presentation on behalf of the British Government to the captain of a Spanish steamer which had saved several British lives.

Japan's New Tonnage in 1917.—A Reuter message from Tokyo states the number of ships of over 1,000 tons built in Japan, under the law passed to encourage shipbuilding, from January to December, 1917, was 39, with a tonnage of 239,681.

Ships for Svenska Lloyd.—This company has ordered two more steamships of 3,200 tons deadweight capacity from the Eriksbergs mek. Verksted for delivery in 1921 and 1922. The yard has, therefore, now got seven sister ships in hand for the Swedish Lloyd.

United States and Dutch Ships.—According to *The Times* Amsterdam correspondent it was announced at a meeting last week at the Dutch Foreign Office, to which were invited all shipowners whose ships are detained in the United States, that the United States Government had made the following conditions for the release of Dutch ships:—Certain of the Dutch ships to serve as Belgian relief ships, and certain others to be employed in the American Coast traffic. If these conditions be agreed to, some of the vessels will receive permission to voyage between Holland and America to carry oil, petrol, grain and fodder destined for Holland.

Concrete Ships in America.—Ships of concrete are to be built by the Torcrete Shipbuilding Company, of Chicago. This new company is negotiating for a suitable site on which to begin building 1,200-ton reinforced-concrete vessels on the Torcrete system. The steamers are to be built for the Great Lakes service. Additional yards are to be established later in New York, New Orleans, and Los Angeles. A number of designs for concrete ships, lighters and barges, have been prepared, and the plans have been submitted to the United States Emergency Fleet Corporation and the Government, with a view to assisting in the construction of merchant marine shipping.

Huge Shipbuilding Programme in United States.—The following statement was made last week by Mr. Edward Hurley, chairman of the United States Shipping Board: "We now have 113 shipyards building vessels for the United States. Of these 74 are entirely new, 16 are small yards which have been expanded, and the remaining 23 are old-established yards, which are filled with orders at the time the United States declared war against Germany. In these yards there were under construction on December 1 last 1,395 vessels, with a total dead-weight tonnage of 8,246,308 tons, and the greater part of this building programme will be completed during 1918. The programme is really stupendous, and here is where the American people can help—by giving moral and material support to the Government—in other words, putting their shoulders to the wheel."

Production of U.S. Tonnage in 1918.—A Reuter message from Washington states that Mr. Hurley, the Chairman of the United States Shipping Board announces that the production of ship tonnage by the United States for 1918 is estimated at 4,500,000 tons. There are 118 shipyards in the country, 51 of which are engaged in the construction of steel ships and 67 of wooden ships. In April, 1917, there were 148 slipways in the country. Now, there are built or being built 716.95 per cent. of which have been completed. Keels have been laid on every slipway completed. The plan for enrolling 380,000 shipyard workers is progressing well. Mr. Hurley believes that two wooden ships will be completed during the present year on each of the slipways provided for such ships, while three or possibly four steel vessels will be completed on each of the slipways for steel ships.

Oeresundsverit, Landskrona.—The yard is to be extended to 40 acres with three watersides. At present the shipbuilding shop, the stores, and two slipways for vessels of 4,000 to 5,000 tons are erected. On one slipway is the keel for an 1,850-ton vessel sold by the company. The dock (620 ft. by 88 ft.) will accommodate vessels up to 15,000 tons, and is to be ready by the end of August next. Two other slipways for vessels up to 15,000 tons and 20,000 tons are in hand. At present 200 men are employed. Ultimately 2,000 men will be employed, and an annual output of 80,000 tons is expected; of the two 1,850-ton and two 4,000-ton vessels at present on order, one of each is for the Sven firm (Stockholm). This yard was founded with a capital of £33,100 in 1915, and increased its capital to £232,000 in 1917. Next to the Gota Werke, it is the largest shipbuilding concern in Sweden.

New Offices.—We are notified that the Sheffield Twist Drill & Steel Company, Ltd., and also Engineering Supplies, Ltd., have removed from 28, Victoria Street, S.W. 1, to Suffolk House, 5, Laurence Pountney Hill, London, E.C. 4.

Partnership Dissolved.—The Constantine & Pickering Steamship Company notify that the business carried on by them for many years at Middlesbrough and London has been dissolved by mutual consent as from December 31 last. Mr. Pickering retires from the business, which will be carried on by Mr. Joseph Constantine in partnership with his son, Mr. William W. Constantine, under the style of Joseph Constantine & Sons.

Shipyard War Savings Scheme.—The directors of Swan, Hunter & Wigham Richardson, Ltd., shipbuilders, of Wallsend, in order to encourage investment in the national funds, have placed 1,000 15s. 6d. War Savings Certificates at the disposal of the Shipyard Association. The first 1,000 employees who purchase 12 certificates will each receive one free certificate. Lower-paid employees are required to purchase six certificates only.

New Zealand Premier and Meat Ships.—In the course of a recent letter which he forwarded to Sir Joseph McCleay, Mr. Massey, Prime Minister of New Zealand, wrote: "I note you say that four of our ships have already been taken to carry meat from the Plate, and now it is intended to take five more. I cannot help thinking that this will be very good news for the meat trusts, but, I am afraid, very sad news for the patriotic New Zealand settlers, who have, since the outbreak of the war, been doing everything that is possible for good citizens to do in the crisis through which the Empire is passing."

British Empire Honours.—The inclusion of the names of representative merchant seamen in the second list of the Order of the British Empire Honours will give no little satisfaction in nautical circles, since it redeems a promise recently made to the Secretary of the Mercantile Marine Service Association that the claims of the mercantile marine would receive recognition in any future list. Those captains and officers who have been honoured are to be congratulated on receiving so distinctive an acknowledgment of the magnificent manner in which they "carry on" despite the dangers of a war zone which extends for so many hundred miles away from the shores of the Homeland.

The 12½ per Cent. Bonus.—The Minister of Labour has sent the following reply to the telegram from the Clyde on the subject of the 12½ per cent. bonus:—"Your telegram received. The Minister of Labour has decided to adopt the recommendations of the Trade Union Advisory Committee for the Shipbuilding and Engineering Industry as a basis for the settlement of all outstanding claims arising from the 12½ per cent. Order. All applications should be made through the Trade Union Executive, who are the regular normal channels of communication between the trade unions and the Ministry of Labour. A stoppage of work is to be strongly deprecated. No application will be referred for settlement so long as a stoppage of work continues. The Minister is desirous of arriving at a settlement of these applications as quickly as possible and hopes to receive the ready assistance of all concerned."

Important German Development in Concrete Ships.—The firm of Wayss & Freytag A.G., one of the oldest and leading German firms specialising in reinforced concrete, has established a shipbuilding department. The staff heads of the new department will be Fr. W. Achenbach as shipbuilding superintendent, and Dr. Morsch (Professor at the Stuttgart High School) as reinforced concrete expert. The new department will have the advantage of £392,000 share capital and of the firm's 42 years' experience in concrete work of all descriptions. Observations and tests have been made concerning the behaviour of various floating vessels of reinforced concrete; and concerning the resistance of concrete to seawater, oil, vibration, and so on. A number of designs have been developed for simple types of vessels, and these have been offered for criticism and survey in Berlin. A subsidiary company, with a capital of £83,300, has been formed in Budapest to build Danube vessels of reinforced concrete (a 700-ton barge will be built first).

Candidates for Associate Membership, Inst.C.E. The Council of the Institution of Civil Engineers have resolved that its examination in engineering drawing, bills of quantities and elementary knowledge of specifications, which is at present an optional subject, shall be, after January 1, 1919, obligatory for all candidates for Associate Membership. The examination is intended to be a suitable test of the knowledge and skill which should be acquired

during the requisite training in engineering offices, and will apply to the several main departments of practice. The tests in drawing and quantities may be conducted in part by means of the production of drawings and quantities which have been prepared by candidates under their employers and teachers. Students of the Institution may be allowed to take the examination prior to the time at which they become candidates for election as Associate Members.

Warning to Masters, Officers and Seamen.—A notice issued by the Marine Department of the Board of Trade is as follows: "Masters, officers, seamen, and other persons concerned, are warned that, under Regulation 24 of the Defence of the Realm Regulations, it is an offence to convey, to or from the United Kingdom, any letter, written message or memorandum. Any person who acts in contravention of this Regulation is liable to heavy penalties. Attempts made by anyone to induce an officer, seaman, or other person on board ship to commit such an offence should be reported at once to the master, who should bring the matter to the notice of the local British naval, military or Consular Authorities. This prohibition does not apply to ships' papers; or to shipping documents from shipping companies or business firms relating to the cargo or charter of the vessel and conveyed in open covers in the ship's box; or to any letter, written message or memorandum which is required by the person conveying it for his own use and is otherwise lawful."

Captain J. S. Davidson Memorial.—An exhibition, value £10, to be known as the "Captain J. S. Davidson Memorial Exhibition," is to be offered annually for competition among the students attending the evening classes in the mechanical engineering department of the Municipal Technical Institute, Belfast. This exhibition has been founded by the employees and business associates of Davidson & Co., Ltd., Sirocco Engineering Works, in memory of Captain J. S. Davidson, Machine Gun Company, 108th Infantry Brigade, 36th (Ulster) Division, director and general manager of the firm, who fell on the field of honour near Thiepval, France, on July 1, 1916. The objects of the exhibition are to perpetuate the memory of a brave Ulsterman, and to encourage the study of mechanical engineering subjects, and thereby to be of service to the industrial life and prosperity of Belfast. The award will be based upon the subjects of study laid down for the third-year mechanical engineering course in the evening division of the Institute.

Contracting a Tail Shaft.—In the course of his inaugural address last Tuesday, the new President of the Institute of Marine Engineers, Captain Richard H. Green, R.D.C., said that one of the constant sources of trouble in early days was the fit of propellers on the tail shaft. One case always remained in his memory, on which his firm wrought three days and nights without being able to get a move out of the propeller. All the blades had been removed, but every effort failed. Meanwhile with continual heating both shaft and boss had become very hot, also the superintendent engineer on the matter of delay. As a last desperate resort a ¾-in. hole was bored through the shell of the boss under the seat of one of the blades. A length of ordinary gas pipe was screwed into it and the shore end coupled up to the water main. The water was turned on. With a report that shook the whole ship the sudden contraction of the tail shaft shot the propeller hard against the stern post. The scared look on the face of the old superintendent as he rushed on deck from the cabin brought a general hearty laugh, which relieved the tension of tired and irritated men. No damage resulted either to boss or tail shaft, which were refitted after examination and cleaning.

Manning Ships after the War.—A deputation of the Manning Committee of the National Sailors' and Firemen's Union was received last week by Dr. Addison, Minister of Reconstruction, on the subject of the manning of British ships after the war. Father Hopkins, who introduced the deputation, after referring to the increase in the number of Chinese employed in British ships, said that after the war there would be a great number of men available from the demobilisation of the Navy and Army. It would be important, in order to prevent serious unemployment, that the National Maritime Board of the Ministry of Shipping should be continued. The Board was established for the regulation and supervision of the supply, nationality, engagement, and discharge of seamen in British ships by means of a single source of supply jointly controlled by employers and employed. The deputation asked that there should be no unfair competition. Dr. Addison assured the deputation that the British Government, and indeed the British public, would never allow the seamen to be forgotten, especially as they had so

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"SHIPBUILDING AND SHIPPING RECORD" TABLE OF SHIP SALES.

Name and Type.	Tonnage.	Dimensions Draught in (ft.).	Sold by, to	Builders, hull and year.	Machinery and builders.	Remarks.
Benmore, s.v., 1,497 gr. 1,427 net	242' x 39½' x 23½'	Canadian Government to buyers not stated	J. Reid & Co., Port Glasgow (1870)	—	—	—
Competitor, ss. (single dk.) 3,526 gr. 2,216 net 6,000 d.w.	348½' x 49½' x 25½' (21' 6")	Eskside S.S. Co., Whitby to Houlder, Middleton & Co., London	Furness, Withy & Co., W. Hartlepool (1907)	24, 39, 66 x 45 (Richardsons, Westgarth & Co., Hartlepool)	—	—
Monkshaven, ss. (single dk.) 3,357 gr. 2,097 net 5,850 d.w.	334½' x 48½' x 23½' (21' 7")	Eskside S.S. Co., Whitby, to Houlder, Middleton & Co., London	W. Doxford & Sons, Sunderland (1911)	23, 38, 64 x 45 (W. Doxford & Sons)	—	Price about £300,000.
Moorlands, ss. (single dk.) 3,602 gr. 2,282 net 6,400 d.w.	356½' x 50½' x 21½' (21' 4")	Eskside S.S. Co., Whitby, to Houlder, Middleton & Co., London	W. Doxford & Sons, Sunderland (1910)	25, 40, 67 x 45 (W. Doxford & Sons)	—	—
Crown of Leon, ss. (ex Yanariva) 3,301 gr. 2,135 net 5,600 d.w.	330' x 43' x 18½'	Crown S.S. Co., Glasgow, to buyers not stated	Barclay, Curle & Co., Glasgow (1894)	23½, 39, 64 x 42 (Barclay, Curle & Co.)	—	—
Etonian, ss. (single dk.) 4,306 gr. 2,685 net	385' x 52' x 25' (24' 8")	Cambrian Steam Nav. Co., Cardiff, to buyers not stated	Bartram & Sons, Sunderland (1914)	26, 43, 71 x 48 (J. Dickinson & Sons, Sunderland)	—	—
H. M. Whitney, ss. 2,707 gr. 1,791 net	271½' x 43' x 19½'	Eastern S.S. Corp'n., Boston, Mass., to buyers not stated	W. Cramp & Sons Co., Philadelphia (1890)	29, 45, 74 x 48 (Wm. Cramp & Sons Co.)	—	Price about £75,000.
Kilsyth, ss. (single dk.) 2,340 gr. 1,498 net 3,940 d.w.	305½' x 44½' x 20'	Renfrewshire S.S. Co., Glasgow, to buyers not stated	Craig, Taylor & Co., Stockton (1903)	22, 36½, 58 x 39 (N.E. Mar. Eng. Co., Newcastle)	—	—
Hasaba, ss. 1,913 gr. 1,267 net	240' x 40' x 25'	Mathews S.S. Co., Toronto, to buyers not stated	Chicago S.B. Co., Chicago, Ill. (1891)	21, 35, 55 x 42 (Globe Iron Wks. Co., Cleveland)	—	—
Minna Cords, ss. (single dk.) 1,620 gr. 995 net	261½' x 38' x 16½'	Mr. Aug. Cords, Rostock to Stern & Co., G.m.b.H. Hamburg	Akt. Ges. "Neptun," Rostock (1907)	17½, 30½, 48 x 33½ (A.G. "Neptun")	—	—
Rostellan, s.v. (ex Fendleton Sisters) 990 gr. 879 net	207½' x 38½' x 19½'	W. S. Job, & Co., Inc., New York, to the Universal Shipping Co., New York	Pendleton Bros., Belfast, Me. (1906)	—	—	Price about £18,000.
Stokke, ss. (single dk.) (ex Staudfjord) 1,823 gr. 1,107 net	265' x 42' x 17½'	C. N. Stensholt, Tønsberg, to E. & N. Chr. Evensen, Christiania	Akties. Sorlandets Skibs. Fevig (1916)	20½, 33, 56 x 36 (Fredrikstad M.V. Fredrikstad)	—	—
Talavera, ss. (single dk.) (renamed Fylgia) 1,741 gr. 1,055 net	266' x 37' x 15½'	Angfartygs Aktbolaget Kullen, Helsingborg, to Rederiaktiebolaget Svenska Lloyd, Gothenburg.	W. Dobson & Co., Newcastle (1889)	20, 32, 54 x 39 (N.E. Mar. Eng. Co., Newcastle)	—	—

signally proved their patriotism during the war. He promised his co-operation for the improvement of the sailors' conditions of life, and suggested that the Union should send him definite proposals for meeting the difficulties of the transition period. These proposals would receive careful and sympathetic consideration.

Motor Fishing Boats.—Writing in *Hansa*, H. Gerstmeier suggests that fishing vessels, which may be used for naval purposes during the war, should be fitted with oil engines rather than steam plant. Apart from other advantages, a motor ship can remain longer at sea than a steamship of equal displacement, but lower gross tons register. Steamships have to return more frequently for fuel, thus losing time and incurring heavier expenses for pilotage through mine fields, as well as greater risks from stray mines. Possible detrimental effect of exhaust gases on fish could be overcome by carrying the exhaust to the stern or high up the mast. Auxiliaries would be driven conveniently by electric motors and electric heating could be provided in the living quarters.

Shipbuilding Activity in Germany.—According to the *Berliner Tageblatt*, a number of German shipbuilding companies are already making preparations for the reconstruction of the German mercantile marine, the first step to this end being to consolidate their finances. The Law which was passed recently, making provision for the grant of subsidies to shipping companies towards the cost of new construction, will not make any grant to shipbuilders direct, but the financial assistance promised by the Government to the shipping companies will eventually be realised by them, though it will take some time before this actually happens. In the meantime, yards are being extended. For this purpose capital is clearly a necessity, and of late several companies have seen increasing their capital. Perhaps the most striking instance is that of a comparatively small shipbuilding concern in Hamburg, which is increasing its capital from 300,000 marks to 3,000,000 marks. Since June, 1916, eleven German shipbuilding companies have increased their aggregate capital from 41,930,000 marks to 69,200,000 marks.

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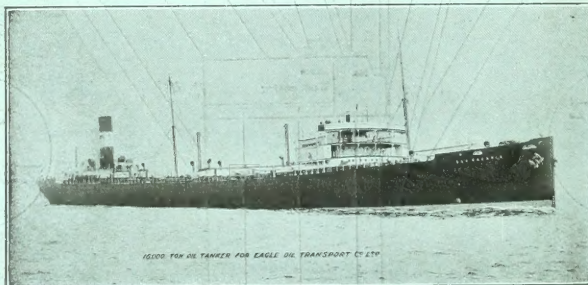
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